UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

ENVIRONMENTAL INTEGRITY PROJECT 1000 Vermont Avenue NW, Suite 1100 Washington, DC 20005, FOOD & WATER WATCH 1616 P St. NW, Suite 300 Washington, DC 20036 CENTER FOR FOOD SAFETY 660 Pennsylvania Avenue SE, Suite 302 Washington, DC 20003, HUMANE SOCIETY OF THE UNITED STATES 1255 23rd Street NW Washington, DC 20037, CLEAN WISCONSIN 634 West Main Street, #300 Madison, WI 53703, IOWA CITIZENS FOR COMMUNITY IMPROVEMENT 2001 Forest Avenue Des Moines, IA 50311, and ASSOCIATION OF IRRITATED RESIDENTS 29389 Fresno Ave Shafter, CA 93263 *Plaintiffs,* v. UNITED STATES ENVIRONMENTAL PROTECTION AGENCY and REGINA McCARTHY, in her official capacity as Administrator, 1200 Pennsylvania Ave. NW Washington, DC 20460 *Defendants*.	Case No. **COMPLAINT FOR DECLARATORY AND INJUNCTIVE RELIEF** Clean Air Act, 42 U.S.C. § 7604 and Administrative Procedure Act, 5 U.S.C. § 702

COMPLAINT

Plaintiffs Environmental Integrity Project (EIP), Food & Water Watch (FWW), Center for Food Safety (CFS), The Humane Society of the United States (HSUS), Iowa Citizens for Community Improvement (ICCI), Association of Irritated Residents (AIR), and Clean Wisconsin (collectively, Plaintiffs), on behalf of themselves and their members, allege as follows:

I. NATURE OF ACTION

1. This is an action for injunctive and declaratory relief under the Clean Air Act (CAA) citizen suit provision, 42 U.S.C. §§ 7604(a), and section 702 of the Administrative Procedure Act (APA), challenging the unreasonable delay on the part of the United States Environmental Protection Agency (EPA or "the Agency") in responding to Plaintiffs' 2011 legal petition. That petition requested that EPA use its authority under the CAA to find that ammonia gas pollution (NH_3) endangers public health and welfare, to designate ammonia as a CAA "criteria pollutant" under CAA § 108 and to establish National Ambient Air Quality Standards (NAAQS) for ammonia in the ambient air to protect public health and welfare with an adequate margin of safety under CAA § 109.

2. Ammonia gas harms public health and welfare in numerous ways, including directly causing acute and chronic respiratory health impacts; mixing with other pollutants to form fine particulate matter ($PM_{2.5}$) that causes, *inter alia*, respiratory symptoms, decreased lung function, aggravated asthma symptoms, heart disease, and premature death; decreasing quality of life in rural communities; polluting water and soil through deposition; creating regional haze that reduces visibility in parks and other scenic places; and decreasing property values. Large livestock operations are the leading source of ammonia gas emissions in the U.S.

3. Despite the significant and growing body of scientific research demonstrating that ambient ammonia pollution emitted by animal feeding operations (AFOs), concentrated animal feeding operations (CAFOs), and other sources cause and contribute to air pollution that endangers public health and welfare, EPA has not acted to directly regulate this pollutant under the CAA. As a result, thousands of sources continue to emit ammonia pollution unabated. CAFOs are not currently required to meet any testing, performance, or emission standards under the CAA.

4. Accordingly, on April 5, 2011, EIP and twenty other national, regional, and community-based organizations (collectively, "Petitioners") submitted a formal petition to EPA to make an endangerment finding for ammonia and to establish health and welfare-based ambient pollution standards ("2011 Petition" or "Petition"). *See* Ex. A. Plaintiffs were among the signatories to the Petition. The Petition detailed the ways in which ambient ammonia air pollution endangers public health and welfare and the reasons it meets the CAA requirements for listing as a criteria pollutant.

5. Over five years have passed since EPA received the 2011 Petition. However, EPA has not formally responded or taken any meaningful action on the Petition, in violation of the CAA and the APA. Records obtained by Plaintiffs in pursuant to a July 2013 Freedom of Information Act (FOIA) request indicate that EPA is not actively considering the Petition or moving toward a final determination on the Petition, but rather has yet to take the matter under any meaningful consideration.

6. As EPA lags, evidence of ammonia air pollution's health and welfare impacts continues to amass, supporting swift action to regulate the pollutant under the CAA. Accordingly, we respectfully request that the Court declare that EPA's failure to respond to

Plaintiffs' 2011 Petition within a reasonable time violates the CAA; order EPA to make a final decision on the 2011 Petition within 90 days; and retain jurisdiction over this matter until EPA has fulfilled its legal obligations, as set forth in this complaint.

II. JURISDICTION AND VENUE

7. This Court has jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 (federal question) and 1346 (United States as Defendant).

8. The relief requested is authorized pursuant to 28 U.S.C. §§ 2201 and 2202 (declaratory relief). An actual, justiciable controversy exists between Plaintiffs and EPA, within the meaning of 28 U.S.C. § 2201 (declaratory judgments).

9. Plaintiffs have a right to bring this action in federal district court pursuant to the CAA, 42 U.S.C. § 7604(a), and the APA, 5 U.S.C. § 702.

10. Venue is properly vested in this Court pursuant to 28 U.S.C. § 1391(e), because one or more Plaintiffs reside in this District.

III. PARTIES

Plaintiffs

11. Plaintiff EIP is a national nonprofit organization headquartered in Washington, D.C. EIP is dedicated to advocating for more effective enforcement of environmental laws, including the CAA. Since 2002, EIP has worked to improve federal and state regulation of AFOs and CAFOs and to improve air and water quality in areas significantly impacted by these facilities' pollution, focusing in the Upper Midwest and the Mid-Atlantic. EIP advocates for application of clean air laws to AFOs nationwide, because these operations endanger public health and welfare with their unrestricted pollution emissions. EIP also works to gather and analyze pollution data and provide this information to the public, and has been actively engaged

in EPA's ongoing process, now stalled, to develop accurate tools to estimate AFO air pollution. EIP has a strong organizational interest in strengthening the CAA's regulation of AFO ammonia pollution and is therefore injured by EPA's failure to respond to the 2011 Petition.

12. Plaintiff FWW is a national nonprofit membership organization working to ensure that the food, water, and fish we consume is safe, accessible, and sustainably produced. So that all consumers can enjoy and trust in the food and drink they eat and drink, FWW helps people take charge of where food comes from; keep clean, affordable, public tap water flowing freely to homes; protect the environmental quality of oceans; ensure that the government does its job protecting citizens; and educate about the importance of keeping the global commons – shared resources – under public control. FWW has approximately 76,000 members and 900,000 supporters nationwide. Increasing EPA regulation of factory farm pollution is one of FWW's priorities, and FWW has expended significant resources to educate its membership and the general public about the need for increased EPA oversight, including through its report, *Factory Farm Nation: How America Turned its Livestock Farms into Factories*. FWW believes that regulating ammonia emissions from factory farms would benefit public health in rural communities and make our food supply safer and more sustainable.

13. Plaintiff CFS is a national nonprofit membership organization dedicated to protecting human health and the environment by curbing the proliferation of harmful food production technologies, such as AFOs, and instead promoting sustainable agriculture. CFS represents 750,000 farmer and consumer members throughout the country who support safe, sustainable agriculture. CFS's mission is to protect the public's right to know how their food is produced. CFS utilizes regulatory actions, citizen engagement, legislation, and when necessary, litigation, to promote transparency and accountability in the factory farm industry. CFS believes

that EPA must regulate ammonia and other pollutants from factory farms in order to protect human health and the environment and create a healthier, safer food supply.

14. Plaintiff HSUS is a nonprofit organization headquartered in the District of Columbia and incorporated in the State of Delaware. HSUS is the largest animal protection organization in the United States, representing millions of members and constituents. Since its establishment in 1954, HSUS has advocated against the inhumane treatment of animals raised for food. To that end, HSUS actively advocates for better laws to protect animals and the environment; conducts mission-specific campaigns; and advocates against practices that injure, harass or otherwise harm animals, including farm animals and wildlife. Specifically, with its mission to create a humane and sustainable world for all animals—including people and communities—HSUS endeavors to ensure that its members are aware of and not injured by hazardous substances, including ammonia, released by CAFOs. HSUS has actively campaigned to regulate air pollutants being emitted by CAFOs through efforts with the EPA, in Congress, and in the Courts. A member of HSUS in the Lathrop, California community teamed up with HSUS to bring a suit against a large chicken CAFO that emitted toxic levels of ammonia into their neighborhood, and HSUS has petitioned the EPA to list and regulate CAFOs as stationary sources under the Clean Air Act. In the course of HSUS cases, experts documented ambient ammonia levels above recommended health limits in the local community. HSUS brings this action on behalf of itself and its members.

15. Plaintiff ICCI is a nonprofit organization that works to empower and unite grassroots Iowans of all ethnic backgrounds to take control of their communities; involve them in identifying problems and needs and in taking action to address them; and be a vehicle for social, economic, and environmental justice. ICCI's thousands of members work to protect rural

communities from factory farm air and water pollution at the state and national level. Many ICCI members live, farm, and recreate in rural Iowa, and are directly and adversely affected by AFO ammonia emissions.

16. Plaintiff AIR is a California non-profit corporation that advocates for air quality and environmental health in the San Joaquin Valley, with members living in Kern, Kings, Tulare, Fresno, and Stanislaus counties. Members of AIR live, raise their families, work, and recreate in the San Joaquin Valley. They are adversely affected by exposure to levels of air pollution that exceed the health-based $PM_{2.5}$ air quality standards. The adverse effects of such pollution include actual or threatened harm to their health, their families' health, their professional, educational, and economic interests, and their aesthetic and recreational enjoyment of the environment in the San Joaquin Valley. On the basis of air quality issues, AIR has fought the growth of local dairy CAFOs in the San Joaquin Valley. For many years, AIR has requested that the San Joaquin Valley Air Pollution Control District regulate ammonia as a precursor to $PM_{2.5}$ because it forms ammonium nitrate in the winter. Wintertime $PM_{2.5}$ levels in Kern County, at the southern end of the San Joaquin Valley, are the worst in the nation.

17. Plaintiff Clean Wisconsin protects Wisconsin's clean water and air and advocates for clean energy by being an effective voice in the state legislature and by holding elected officials and polluters accountable. Clean Wisconsin's mission is to protect the special places that make Wisconsin such a wonderful place to live, work and play.

18. The environmental, health, aesthetic, economic, informational, and recreational interests of Plaintiffs' members have been and will continue to be adversely affected by EPA's continued failure to act on this Petition.

Defendants

19. Defendant EPA is tasked with implementing the federal CAA and regulating air pollution to protect the nation's public health and welfare by, among other things, establishing national air quality standards for pollutants that threaten public health or welfare. 42 U.S.C. §§ 7408, 7409.

20. Defendant Regina McCarthy is sued in her official capacity as the Administrator of the EPA. As EPA Administrator, Ms. McCarthy is responsible for EPA's actions to address the Petition.

21. Administrator McCarthy and EPA are collectively referred to herein as EPA, the Agency, or Defendant.

IV. LEGAL BACKGROUND

Clean Air Act

22. Congress enacted the CAA in 1970 to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population," CAA § 101(b)(1), 42 U.S.C. § 7401(b)(1), and to "encourage or otherwise promote reasonable Federal, State, and local governmental actions . . . for pollution prevention." *Id*. § 7401(c). EPA is charged with implementing the CAA, and is responsible for administering federal air pollution programs and delegating authority for state air pollution programs.

23. One of the CAA's primary programs is the criteria pollutant program, under which EPA regulates common air pollutants by establishing National Ambient Air Quality Standards, or NAAQS, to protect public health and welfare by limiting the concentration of criteria pollutants in the ambient air. EPA has regulated six air pollutants under the criteria pollutant program: particulate matter (PM) 10 microns or less in diameter (both PM_{10} and the smaller $PM_{2.5}$ fraction), carbon monoxide, nitrogen oxides, sulfur oxides, ground-level ozone, and lead.

24. Section 108 of the CAA establishes the requirements for listing new criteria pollutants under the NAAQS program. The provision requires the EPA Administrator to publish and periodically revise a list that "includes each air pollutant: (A) emissions of which, in h[er] judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare; (B) the presence of which in the ambient air results from numerous or diverse mobile or stationary sources; and (C) for which air quality criteria had not been issued before December 31, 1970, but for which [s]he plans to issue air quality criteria under this section." 42 U.S.C. § 7408(a)(1).

25. The CAA defines "air pollutant" broadly as "any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive . . . substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term 'air pollutant' is used." 42 U.S.C. § 7602(g). EPA defines the ambient air as "that portion of the atmosphere, external to buildings, to which the general public has access." 40 C.F.R. § 50.1(e).

26. Once EPA lists a pollutant as a criteria pollutant under Section 108, the listing triggers non-discretionary duties under Section 109 to establish primary and secondary standards sufficient to protect public health and welfare. 42 U.S.C. § 7409. The primary standards must protect public health, including the health of sensitive populations. The secondary standards must protect public welfare, "which includes, but is not limited to, effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or

combination with other air pollutants." 42 U.S.C. § 7602(h). These standards are referred to collectively as NAAQS.

27. Section 109 requires EPA to review the NAAQS at least every five years and "promulgate such new standards as may be appropriate in accordance with section [108]," providing that the Agency "may review and revise criteria or promulgate new standards earlier or more frequently." 42 U.S.C. § 7409(d).

28. Once EPA establishes a NAAQS, states must develop plans to reduce emissions in areas with air quality that violates the NAAQS ("nonattainment areas") and to attain the standard by the applicable deadline, and must incorporate these plans into State Implementation Plans (SIPs). To ensure compliance with the NAAQS, states must implement permitting programs applicable to stationary sources in nonattainment areas (New Source Review) and in areas that meet the standard (Prevention of Significant Deterioration).

29. All stationary sources that meet "major" source thresholds for emissions of a criteria pollutant or other regulated pollutant must obtain a preconstruction New Source Review or Prevention of Significant Deterioration permit and a CAA operating permit, known as a Title V Permit. Title V permits include all SIP requirements and all other applicable CAA requirements, including those necessary to bring the airshed into compliance with, or to maintain compliance with, the NAAQS.

30. The CAA citizen suit provision permits any person to bring a civil action against the EPA "where there is alleged a failure of the Administrator to perform any act or duty under this chapter which is not discretionary with the Administrator" and to "compel . . . agency action unreasonably delayed." 42 U.S.C. § 7604(a).

Administrative Procedure Act

31. Under the APA, agencies must "give an interested person the right to petition for the issuance, amendment, or repeal of a rule." 5 U.S.C. § 553(e). A "rule" is "the whole or part of an agency statement of general or particular applicability and future effect designed to implement, interpret, or prescribe law or policy." *Id.* § 551(4).

32. The APA requires that "[w]ith due regard for the convenience and necessity of the parties or their representatives and within a reasonable time, each agency shall proceed to conclude a matter presented to it." *Id.*. § 555(b). If an agency denies a petition in whole or in part, it must provide "[p]rompt notice" to the petitioner. *Id*. § 555(e).

33. Although the above-described duty to timely respond to Plaintiffs' Petition derives from the APA, this Court recently held – in an order dismissing Plaintiffs' first attempt to compel EPA to respond to their Petition – that an action alleging unreasonable delay in responding to a petition for CAA rulemaking must be brought as a CAA citizen suit. *Envtl. Integrity Project v. EPA*, 160 F. Supp. 3d 50 (D.D.C. 2015).

V. FACTUAL BACKGROUND

Sources of Ammonia Emissions

34. Numerous industries contribute to the nation's ammonia gas emissions, including fertilizer plants, coal plants, sewage treatment plants, petroleum refineries, and paper mills. However, EPA has described livestock operations as a "dominant" contributor. EPA, *Estimating Ammonia Emissions from Anthropogenic Nonagricultural Sources – Draft Final Report* 1 (Apr. 2004). U.S. livestock production itself is dominated by AFOs and CAFOs. U.S. Department of Agriculture, National Agricultural Statistics Service (2012).

35. AFOs and CAFOs are facilities that confine livestock in buildings or feedlots without vegetation, storing the large quantities of waste generated in pits, lagoons, or stockpiles before disposal, typically via application to crop land. CAFOs are the subset of the largest AFOs, and can house hundreds, thousands, or even millions of animals in confinement conditions. EPA recently estimated that there are approximately 20,000 CAFOs nationwide. National Pollutant Discharge Elimination System ("NPDES") Concentrated Animal Feeding Operation ("CAFO") Reporting Rule, 76 Fed. Reg. 65,431, 65,445 (Oct. 21, 2011).

36. AFO and CAFO waste contains organic nitrogen compounds, which produce ammonia and ammonium (NH_4^+) as byproducts of the microbial decomposition process during storage and application. As a result, AFOs emit ammonia gas from all areas containing waste, including livestock confinement buildings and their ventilation systems, feedlots, liquid and solid animal waste storage facilities, and land application fields.

37. These emissions have both short- and long-range impacts, and have a typical transport time ranging from one to five days.[1] Because "[p]recipitation readily removes most reactive nitrogen compounds, such as ammonia and nitrogen oxides, from the atmosphere,"[2] a significant percentage of volatilized ammonia can re-deposit within these first few days. Deposition comprising up to 20% of the volatilized gas occurs within several hundred meters of the emissions source.[3] Ammonia that stays in the atmosphere may react with acidic compounds such as nitrogen oxides and sulfur dioxide, forming small particles of ammonium nitrate and ammonium sulfate known as ammonium aerosols.[4] Ammonia that converts to ammonium

[1] Viney P. Aneja et al., *Ammonia Assessment from Agriculture: U.S. Status and Needs*, 37 Envtl. Quality 515, 516 (2008) [hereinafter Aneja].
[2] U.S. Department of the Interior, U.S. Geological Survey (USGS), *Atmospheric Deposition Program of the U.S. Geological Survey: Fact Sheet FS-112-00* at 2 (Dec. 2000), *available at* http://bqs.usgs.gov/AcidRain/program.pdf.
[3] Shabtai Bittman & Robert Mikkelsen, *Ammonia Emissions from Agricultural Operations: Livestock*, 93 Better Crops through Plant Food 1, 29 (2009).
[4] *Id*.

aerosol particles rather than depositing directly has a much longer average transport time, ranging from one to fifteen days, and these particles may travel thousands of kilometers before re-depositing.[5]

Public Health Impacts of Ammonia

38. Exposure to ammonia alone or in combination with other pollutants can cause a broad range of acute and chronic health impacts, including eye, nose, throat, and chest irritation, headache, dizziness, urge to cough, and general discomfort. EPA and peer-reviewed research demonstrates ammonia's toxicity; prolonged exposure to low concentrations of ammonia can cause long-term health impacts, while short-term exposure to extremely high concentrations can be fatal.

39. Several federal government agencies have established public exposure recommendations and worker exposure limits and regulations for ammonia gas due to its proven health and safety risks. However, with the exception of the Occupational Safety and Health Administration's limited workplace exposure limits, which assume exposures of no more than 40 hours per week, these are recommendations based on exposure research, rather than enforceable limits. Moreover, these various health benchmarks and exposure limits were established considering exposure to ammonia in isolation. AFOs and CAFOs emit ammonia in combination with numerous other air pollutants, including hydrogen sulfide, particulate matter, methane, volatile organic compounds (VOCs) and endotoxins. These ammonia emissions contribute to a mix of air pollution that poses a greater public health threat than ammonia gas alone, and communities living near AFOs have documented adverse health effects as a result of these mixed exposures.

[5] Aneja, *supra*, at 516.

40. Researchers who have studied the health impacts of ammonia air pollution, alone and in combination with these other AFO air emissions, have recommended that EPA regulate ammonia under the CAA. In 2002, Iowa State University and the University of Iowa issued a comprehensive study that compiled and analyzed significant published research on the human health effects of ammonia gas exposure from CAFOs. This study found that exposure to very low levels of ammonia can cause adverse health effects and that peer-reviewed research has linked exposure to CAFO emissions to an increased prevalence of respiratory symptoms. As a result, the Universities recommended that EPA regulate ammonia under the CAA NAAQS program and establish a health-based ambient ammonia limit of 0.15 ppm.[6]

41. In 2008, the Pew Commission on Industrial Farm Animal Production (Commission), an independent project of Johns Hopkins Bloomberg School of Public Health and the Pew Charitable Trusts, released another comprehensive report on the impacts of industrial livestock production. This report, "Putting Meat on the Table: Industrial Farm Animal Production in America,"[7] compiled the published literature on a wide range of CAFO impacts, including ammonia and other air emissions, and their effects on public health. Among its recommendations, the Commission concluded that "EPA should enforce all provisions of . . . the [CAA] that apply to [industrial livestock operations] and "should develop a standardized approach for regulating air pollution" from CAFOs under the CAA.[8] The Commission also noted the complicated health effects of the mixed air pollutants found in CAFO emissions and the importance of considering these mixed exposures when assessing health risks.

[6] Iowa State Univ. & Univ. of Iowa Study Group, *Iowa Concentrated Animal Feeding Operations Air Quality Study* 9 (2002).
[7] Pew Commission on Industrial Farm Animal Production, *Putting Meat on the Table: Industrial Farm Animal Production in America* (2008).
[8] *Id.* at 75.

42. In addition to the established health effects of ammonia itself, the gas is also a precursor to the formation of $PM_{2.5}$, which causes a distinct set of health threats. *See, e.g.*, Clean Air Fine Particle Implementation Rule, 72 Fed. Reg. 20586, 20589 (Apr. 25, 2007) ("The main precursor gases associated with fine particle formation are SO_2, NOx, volatile organic compounds (VOC), and ammonia"); *Natural Resources Def. Council v. EPA*, 706 F.3d 428, 435 n. 7 (D.C. Cir. 2013) ("Ammonia is a precursor to fine particulate matter"). Ambient ammonia pollution that reacts with other compounds forms ammonium aerosol particles that are smaller than 2.5 microns in diameter, and are therefore $PM_{2.5}$. Such extremely small particles are inhalable and can lodge deeply in the lungs and even enter the bloodstream. $PM_{2.5}$ causes a suite of significant public health impacts, including respiratory symptoms, decreased lung function, aggravated asthma symptoms, chronic bronchitis, irregular heartbeat, heart attacks, and premature death.

43. Research indicates that ammonia emissions are a significant driver of seasonal $PM_{2.5}$ formation in certain geographic regions, and that reductions in ammonia emissions are an effective way to reduce $PM_{2.5}$ concentrations, particularly in winter.[9] One study estimated that ammonia comprises 47% of the $PM_{2.5}$ in the Eastern U.S.[10] Another study conservatively estimates that ammonia emissions from livestock specifically lead to the formation of 9-11% of total $PM_{2.5}$ in the U.S., and up to 20% of winter $PM_{2.5}$ in the Upper Midwest.[11] Ammonium

[9] R. W. Pinder et al., *Environmental Impact of Atmospheric NH_3 Emissions Under Present and Future Conditions in the Eastern United States*, 35 Geophysical Res. Letters L12808, 1 (June 2008).
[10] Natalie Anderson et al., *Airborne Reduced Nitrogen: Ammonia Emissions from Agriculture and Other Sources*, 29 Env't Int'l 277 (2003).
[11] Alexander N. Hristov, Associate Professor of Dairy Nutrition, Penn State Department of Dairy and Animal Science, *Livestock Contribution to Fine Particulate Matter (PM2.5) in the U.S.*, 3 (Feb. 16, 2009).

nitrate in the San Joaquin Valley ranges between 54% and 65% of total $PM_{2.5}$ mass during peak winter days.[12]

44. With respect to major stationary sources, Subpart 4 of Part D of Title I of the CAA establishes a rebuttable presumption that precursors to PM_{10} and $PM_{2.5}$ are significant contributors to nonattainment. 42 U.S.C. § 7513a(e).[13] States must either regulate major stationary sources of $PM_{2.5}$ precursor pollutants, including ammonia, in nonattainment areas, or rebut the presumption that the precursors significantly contribute to the nonattainment. CAA § 189(e).

45. This presumption, however, does not ensure that states will regulate ammonia emissions. There is no requirement to address ammonia in attainment areas. In nonattainment areas, states may seek to rebut the presumption that they must regulate major stationary sources of ammonia, and there is no requirement to address ammonia in attainment areas. *See, e.g.*, *Ass'n of Irritated Residents v. U.S. Envtl. Prot. Agency*, 423 F.3d 989, 996-97 (9th Cir. 2005).

Public Welfare Impacts of Ammonia

46. AFO ammonia emissions negatively impact public welfare in several ways. Ammonia emissions re-deposit in water and on land, contributing to nitrogen pollution in waterways and to the acidification of soils and forests. Nitrogen deposition in waterways leads to nutrient overloading, or eutrophication, that causes algae blooms, harms the aquatic ecosystem, and leads to the creation of "dead zones" where fish and other aquatic life cannot survive. Terrestrial ammonia nitrogen deposition decreases soil quality and cropland productivity, harms vegetation, and degrades the health of forest ecosystems.

[12] San Joaquin Valley Air Pollution Control District, *2012 PM2.5 Plan* at 2-10, 2-11 (Dec. 20, 2012), http://www.valleyair.org/Air_Quality_Plans/PM25Plan2012/CompletedPlanbookmarked.pdf.
[13] Although 40 C.F.R. § 51.1002(c) suggests the opposite presumption – that ammonia is not a precursor – this "Subpart 1" provision will expire in October, 2016, and the D.C. Circuit has stated that "Subpart 4 expressly governs precursor presumptions." *Natural Resources Def. Council*, 706 F.3d 437 n. 10.

47. Ammonia air pollution and the ammonium aerosol particles it creates contribute to the formation of regional haze by scattering and absorbing light particles. In addition to the health impacts to humans and wildlife resulting from particulate matter, haze harms public welfare by degrading visibility in wilderness areas, areas of cultural significance, and other scenic areas, such as the Grand Canyon, Yosemite National Park, Sequoia National Park, Shenandoah National Park, and the Columbia Gorge National Scenic Area. Haze has also been associated with impacts to climate and changes in precipitation.

48. Of immediate concern to those living near AFOs, AFO ammonia emissions contribute to nuisance odors in rural communities, in turn threatening personal comfort and well-being. Research has demonstrated that exposure to AFO emissions, including ammonia, can adversely affect mood and increase rates of anger, tension, fatigue, confusion, and depression. These emissions further decrease quality of life by making it unpleasant for rural citizens to spend time outdoors.

49. Economic researchers and courts have recognized that ammonia air pollution, in combination with other AFO air emissions and AFO quality of life impacts, also contributes to a documented decline in property values near AFOs. Missouri researchers calculated that every Missouri CAFO lowered surrounding property values by approximately $2.68 million.[14] The Supreme Court of Nebraska has held that a tax board acted arbitrarily when it failed to adjust a home's value downward due to its proximity to a large cattle feedlot. *Darnall Ranch, Inc. v. Banner Co. Bd. of Equal.*, 753 N.W.2d 426 (Neb. 2008).

EPA's National Air Emissions Monitoring Study

[14] Mubarak, H., T.G. Johnson, & K.K. Miller, *The Impacts of Animal Feeding Operations on Rural Land Values*, Report R-99-02, College of Agriculture, Food and Natural Resources, University of Missouri–Columbia, 8 (1999).

50. Despite these numerous public health and welfare impacts from ammonia and the $PM_{2.5}$ it forms in the atmosphere, EPA has not used its authority under the CAA or other air pollution statutes that it administers to quantify, control, or reduce ambient ammonia pollution. In fact, EPA has set no requirements for AFOs to restrict air emissions of any pollutants under the CAA or other air pollution laws.[15] Although EPA initiated a process to develop methods for estimating air emissions from AFOs in 2005, that process was never completed.

51. In recognition that a lack of emissions estimates for AFOs has hindered EPA from effectively regulating AFOs under the CAA and other statutes it administers, EPA entered into an Air Compliance Agreement with thousands of AFO operators in 2005 to obtain information necessary to develop emissions estimating methodologies (emission factors). These AFOs paid for a two-year National Air Emissions Monitoring Study (NAEMS) and agreed to participate in air emissions monitoring. In exchange, EPA granted them safe harbor from EPA enforcement for past civil violations of the permitting provisions of the CAA and the ammonia emissions reporting requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Emergency Planning and Community Right-to-Know Act (EPCRA).

52. NAEMS involved monitoring emissions of ammonia, hydrogen sulfide, VOCs, and particulate pollution at 24 AFO sites between 2007 and 2009. The study only monitored emissions from confinement areas and waste storage systems, and did not address land application of waste, a major source of ammonia emissions. Within 18 months of the conclusion of NAEMS data collection, EPA was to evaluate the data collected and publish unit-specific emission factors. Under the Air Compliance Agreement, once EPA published the final emission factors, participating AFOs would have been required to apply the factors to their facilities to

[15] *See* discussion of potential future regulation of ammonia as a $PM_{2.5}$ precursor, *infra*.

calculate their emissions; assess whether their facilities are in compliance with the CAA, CERCLA, and EPCRA; and either bring their facilities into compliance with the statutes or certify to the EPA that no federal statutory requirements apply to their facilities' emissions, based on the emission factors provided.

53. EPA issued two draft emission factors, addressing the broiler chicken sector and hog and dairy open waste storage systems, for public comment in March 2012. Subsequently, EPA's Science Advisory Board Animal Feeding Operation Emission Review Panel issued a report highly critical of the NAEMS methodology, the data generated, and the initial draft emission factors. EPA has not issued any additional or revised draft emission factors since.

54. EPA's limited actions to establish AFO emission factors do not bring EPA closer to a determination on the 2011 Petition. The emission factors that EPA may eventually establish for AFO ammonia emissions could play a role in state agency efforts to reduce ambient ammonia levels to comply with the health and welfare limits Petitioners seek through their Petition. However, the emission factor development process is fundamentally distinct from an EPA process to determine whether ambient ammonia pollution from AFOs and all other sources may cause or contribute to an endangerment to public health and welfare. The determination that existing ammonia exposures endanger health and welfare must be made based on evidence of the risk of health and environmental impacts from ammonia from all sources, and does not depend on any particular industry sector's contribution to ambient ammonia pollution. Moreover, the establishment of emission factors cannot lead to any CAA regulation of ambient ammonia pollution absent separate EPA action granting the 2011 Petition. Thus EPA cannot rely on the Air Compliance Agreement and NAEMS process to justify the Agency's delay in responding to

the 2011 Petition or to take the place of substantive action to abate the public health threat from this pollutant.

The 2011 Petition

55. EPA is charged with designating criteria pollutants, establishing NAAQS for those pollutants that are protective of public health and welfare, and reviewing the NAAQS at least every 5 years. CAA §§ 108, 109. Scientific research demonstrates that ammonia emissions from AFOs and other sources cause and contribute to pollution that may endanger public health and welfare. However, despite this evidence, EPA has failed to designate ammonia as a criteria pollutant.

56. Petitioners submitted the Petition to EPA on April 5, 2011, and in that document Petitioners summarized evidence demonstrating that ammonia emissions from AFOs and other sources harm public health and welfare and necessitate an endangerment finding by EPA. EPA sent a letter to EIP acknowledging receipt of the Petition on May 9, 2011. The Petition also provided a legal roadmap for EPA's necessary actions, laying out the Agency's authorities and obligations to take certain actions in response to the endangerment posed by ambient ammonia air pollution.

Post-Petition Events

57. On July 9, 2013, EIP convened a teleconference with EPA staff overseeing consideration of the 2011 Petition to determine its status. EPA stated that it was considering the Petition in conjunction with a separate 2009 petition to list CAFOs as a source category under CAA § 111 and establish performance standards for CAFO air emissions, including, but not limited to, ammonia. EPA also indicated it planned to complete the NAEMS process and establish AFO EEMs prior to addressing these two petitions.

58. On this call EIP also requested that EPA open a public docket for documents related to the Petition, such as public input and scientific research about the adverse health and welfare impacts of ammonia air pollution. ("A docket serves as the repository for documents or information related to a particular EPA activity. Agencies, such as EPA, most commonly use dockets for rulemaking actions, but dockets may also be used for various non-rulemaking activities." EPA Docket Center, http://www.epa.gov/dockets/faqs.htm.) The Agency declined to open a docket.

59. On July 22, 2013 EIP submitted a FOIA request for, *inter alia*, "[a]ll records, including all external and internal communications, shared or otherwise maintained by EPA, related to the April 5, 2011 Environmental Integrity Project et al. petition for the regulation of ammonia as a criteria pollutant under Clean Air Act sections 108 and 109."

60. In 2014 and 2015, EPA provided documents responsive to EIP's July 2013 FOIA request related to the 2011 Petition. None of the disclosed records indicate that EPA has taken any meaningful, substantive actions with regard to the Petition or had made any progress towards making a final determination on the Petition.

61. On August 5, 2013, EIP submitted an indexed compilation of 63 scientific studies, reports, and other documents to EPA in support of, and in aid of the Agency's consideration of, the Petition. These studies and reports include both works referenced in the 2011 Petition and additional studies and research, including studies published since the filing of the Petition. On May 28, 2014, EIP submitted an additional recent study on the health impacts of agricultural ammonia emissions to EPA, to aid in the Agency's consideration of the Petition.[16]

[16] Jacob, D. & Paulot, F., *Hidden Cost of U.S. Agricultural Exports: Particulate Matter from Ammonia Emissions*, 48 ENVIRONMENTAL SCIENCE & TECHNOLOGY 903 (2014), *available at* http://acmg.seas.harvard.edu/publications/2014/paulot_export_2014.pdf.

62. On January 28, 2015, Plaintiffs filed a complaint with this Court to compel EPA to respond to the 2011 Petition. The 2015 complaint, unlike the current complaint, was filed under the APA. This Court dismissed the 2015 complaint on jurisdictional grounds, holding that Plaintiffs' right to sue derives not from the APA, but from the CAA. *Envtl. Integrity Project*, 160 F. Supp. 3d 50.

63. More than five years have passed since Petitioners filed their legal Petition urging EPA to take action to address ammonia air pollution under the CAA, yet EPA still has not formally responded to, or even begun a significant review of, the 2011 Petition. EPA's denial of EIP's request to open a public docket as a repository for related information further indicates the agency's failure to consider the substance and merits of the Petition in a meaningful way.

Harm to Plaintiffs

64. EPA's unlawful delay in responding to the 2011 Petition injures Plaintiff organizations by, *inter alia*, denying them vital information about EPA's plan to address ammonia air pollution from AFOs, CAFOs, and other sources. By denying Plaintiffs the essential information that a Petition response would contain, EPA's failure to respond to the 2011 Petition has violated Plaintiffs' procedural and substantive rights under the APA and the CAA. Additionally, EPA's failure to act on the Petition directly harms Plaintiffs' concrete organizational interests by impeding their abilities as public interest nonprofit organizations to facilitate public involvement in governmental decision-making, and by foreclosing the statutory right that allows for public participation through petitioning for rulemaking. As such, EPA's failure to act has effectively negated Plaintiffs' right to petition a federal agency for rulemaking. Further, EPA's continued failure to respond to the 2011 Petition deprives Plaintiffs of a decision

on the Petition's merits, and, if necessary, the opportunity to seek judicial review of EPA's final decision.

65. All of the Plaintiff organizations are adversely affected by EPA's continued failure to respond to the 2011 Petition, because this delay prevents Plaintiffs from pursuing clean air protections central to their organizational missions and has required Plaintiff organizations to expend significant resources they could have spent elsewhere to obtain an EPA determination on the Petition.

66. Plaintiffs FWW, HSUS, CFS, ICCI, AIR, and Clean Wisconsin also have members whose concrete interests in their health, environmental protection, and quality of life are being and will be adversely affected by EPA's continued failure to respond to the 2011 Petition. These Plaintiffs' members are suffering and will suffer an ongoing threat to their health and welfare and the health and welfare of their environment as long as ammonia air pollution goes unaddressed by EPA. Specifically, Plaintiffs have members throughout the country who live near AFOs and CAFOs and routinely breathe the ammonia air pollution that these facilities emit. These members have experienced, and continue to experience, physical and mental harm due to unregulated ammonia emissions, including burning of the eyes, nose, and throat, other respiratory symptoms, headaches, nausea, and other chronic health problems. These members have been forced to curtail outdoor activities due to ammonia air pollution, including ammonium nitrate and ammonium sulfate, reducing their ability to use and enjoy their property. EPA's failure to address the 2011 Petition has prevented Plaintiffs and their members from obtaining relief from these concrete harms.

67. The requested relief will redress these harms by requiring EPA to respond to the 2011 Petition, which will result either in a response that fulfills EPA's statutory duty to protect

public health and welfare from ammonia air pollution, or a final agency action that Plaintiffs may challenge if they disagree with EPA's response, in whole or part. Both results would provide Plaintiff organizations and their members with the information to which they are entitled pursuant to the APA and the CAA, and also secure their procedural right to receive a timely response to a legal petition for rulemaking.

VI. CLAIM FOR RELIEF

68. Plaintiffs incorporate paragraphs 1 through 64, *supra*, by reference.

69. EPA is an "agency" for purposes of the APA. *See* 5 U.S.C. §§ 551(1), 701(b)(1).

70. The CAA is a federal environmental statute designed to prevent and regulate air pollution for the protection of the nation's air quality and the public health and welfare. 42 U.S.C. § 7401.

71. The APA requires agencies to "give an interested person the right to petition for the issuance, amendment, or repeal of a rule." *Id.* § 553(e); *see also id.* § 551(4) (defining "rule" as "the whole or part of an agency statement of general or particular applicability and future effect designed to implement, interpret, or prescribe law or policy"). The APA right to petition encompasses the right to petition for a new, revised, or final rule concerning EPA regulation of ammonia under the CAA criteria pollutant program. *See id.* §§ 551, 553(e).

72. Upon receiving a petition submitted pursuant to the APA, EPA has a duty to provide a timely response to the petitioners. *Id.* § 555(b) (a federal agency must, "within a reasonable amount of time . . . conclude a matter presented to it"); *Id.* § 555(e) ("Prompt notice shall be given of the denial in whole or in part of a written application, petition, or other request of an interested person . . . ."). This response must be substantive and must either grant or deny the petition.

73. The CAA citizen suit provision permits any person to bring a civil action against the EPA "where there is alleged a failure of the Administrator to perform any act or duty under this chapter which is not discretionary with the Administrator" and to "compel … agency action unreasonably delayed." 42 U.S.C. § 7604(a).

74. Where, as here, the EPA has failed to respond to a petition for CAA rulemaking, the CAA citizen suit provision provides the waiver of sovereign immunity and cause of action for a claim that the EPA unreasonably delayed the action required under the APA. *Envtl. Integrity Project*, 160 F. Supp. 3d at *4. Plaintiffs do not concede that the APA does not provide a cause of action for situations involving EPA inaction under the CAA and reserve the right to file such APA unreasonable delay claims in this Court or other district courts involving other EPA failures to act.

75. The CAA requires 180 days' notice prior to commencing CAA citizen suits alleging unreasonable delay. 42 U.S.C. § 7604(a). Plaintiffs notified Defendants of their intent to sue on March 1, 2016. *See* Ex. B. EPA has not responded to Plaintiffs' notice, and more than 180 days have elapsed since Plaintiffs provided notice.

VII. REQUEST FOR RELIEF

WHEREFORE, Plaintiffs respectfully request that this Court:

(1) Declare that EPA has violated the CAA and the APA by failing to provide a timely response to the 2011 Petition;

(2) Declare that EPA continues to be in violation of the CAA and the APA by failing to respond to the 2011 Petition;

(3) Order EPA to respond to the 2011 Petition within 90 days;

(4) Retain jurisdiction over this action to ensure compliance with this Court's decree;

(5) Award Plaintiffs attorneys' fees and all other reasonable expenses incurred in pursuit of this action; and

(6) Grant such further relief as the Court deems just and proper.

Respectfully submitted this 4th day of November, 2016,

/s/ Abel Russ
Abel Russ
(District of Columbia Bar No. 1007020)
Environmental Integrity Project
1000 Vermont Avenue NW, Suite 1100
Washington, DC 20005
(802) 482-5379
aruss@environmentalintegrity.org
Attorney for Plaintiffs Environmental Integrity Project, Iowa Citizens for Community Improvement, and Clean Wisconsin

Tarah Heinzen
(District of Columbia Bar No. 1019829)
Food & Water Watch
1616 P street NW, Suite 300
Washington, DC 20036
202-683-2457
theinzen@fwwatch.org
Attorney for Food & Water Watch

Paige M. Tomaselli (*Pro Hac Vice pending*)
Center for Food Safety
303 Sacramento Street, Second Floor
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(415) 826-0507 (facsimile)
ptomaselli@centerforfoodsafety.org
Attorney for Plaintiff Center for Food Safety

Hallie Templeton
(District of Columbia Bar No. 1001756)
Peter Brandt
(District of Columbia Bar No. 982936)
The Humane Society of the United States
1255 23rd Street NW
Washington, DC 20037
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(202) 778-6134 (facsimile)
htempleton@humanesociety.org
pbrandt@humanesociety.org
Attorneys for The Humane Society of the United States

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Center on Race, Poverty & the Environment
1999 Harrison Street, Suite 650
Oakland, CA 94612
(415) 346-4179 x304
(415) 346-8723 (facsimile)
bnewell@crpe-ej.org
Attorney for the Association of Irritated Residents

CIVIL COVER SHEET

JS-44 (Rev. 7/16 DC)

I. (a) PLAINTIFFS

Environmental INtegrity Project; Food & Water Watch; Humane Society of the United States; Center for Food Safety; Iowa Citizens for Community Improvement; Clean Wisconsin; Association of Irritated Residents

(b) COUNTY OF RESIDENCE OF FIRST LISTED PLAINTIFF 11001
(EXCEPT IN U.S. PLAINTIFF CASES)

DEFENDANTS

United States Environmental Protection Agency; Regina McCarthy, in her official capacity as Administrator of the Environmental Protection Agency

COUNTY OF RESIDENCE OF FIRST LISTED DEFENDANT _____
(IN U.S. PLAINTIFF CASES ONLY)
NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE TRACT OF LAND INVOLVED

(c) ATTORNEYS (FIRM NAME, ADDRESS, AND TELEPHONE NUMBER)

Abel Russ, Environmental Integrity Project
1000 Vermont Ave. NW, Suite 1100
Washington , DC 20005
802-482-5379

ATTORNEYS (IF KNOWN)

II. BASIS OF JURISDICTION
(PLACE AN x IN ONE BOX ONLY)

- ○ 1 U.S. Government Plaintiff
- ○ 3 Federal Question (U.S. Government Not a Party)
- ◉ 2 U.S. Government Defendant
- ○ 4 Diversity (Indicate Citizenship of Parties in item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (PLACE AN x IN ONE BOX FOR PLAINTIFF AND ONE BOX FOR DEFENDANT) **FOR DIVERSITY CASES ONLY!**

	PTF	DFT		PTF	DFT
Citizen of this State	○ 1	○ 1	Incorporated or Principal Place of Business in This State	○ 4	○ 4
Citizen of Another State	○ 2	○ 2	Incorporated and Principal Place of Business in Another State	○ 5	○ 5
Citizen or Subject of a Foreign Country	○ 3	○ 3	Foreign Nation	○ 6	○ 6

IV. CASE ASSIGNMENT AND NATURE OF SUIT
(Place an X in one category, A-N, that best represents your Cause of Action and one in a corresponding Nature of Suit)

○ A. *Antitrust*

☐ 410 Antitrust

○ B. *Personal Injury/ Malpractice*

☐ 310 Airplane
☐ 315 Airplane Product Liability
☐ 320 Assault, Libel & Slander
☐ 330 Federal Employers Liability
☐ 340 Marine
☐ 345 Marine Product Liability
☐ 350 Motor Vehicle
☐ 355 Motor Vehicle Product Liability
☐ 360 Other Personal Injury
☐ 362 Medical Malpractice
☐ 365 Product Liability
☐ 367 Health Care/Pharmaceutical Personal Injury Product Liability
☐ 368 Asbestos Product Liability

◉ C. *Administrative Agency Review*

☐ 151 Medicare Act

Social Security
☐ 861 HIA (1395ff)
☐ 862 Black Lung (923)
☐ 863 DIWC/DIWW (405(g))
☐ 864 SSID Title XVI
☐ 865 RSI (405(g))

Other Statutes
☐ 891 Agricultural Acts
☒ 893 Environmental Matters
☐ 890 Other Statutory Actions (If Administrative Agency is Involved)

○ D. *Temporary Restraining Order/Preliminary Injunction*

Any nature of suit from any category may be selected for this category of case assignment.

(If Antitrust, then A governs)

○ E. *General Civil (Other)* OR **○ F. *Pro Se General Civil***

Real Property
☐ 210 Land Condemnation
☐ 220 Foreclosure
☐ 230 Rent, Lease & Ejectment
☐ 240 Torts to Land
☐ 245 Tort Product Liability
☐ 290 All Other Real Property

Personal Property
☐ 370 Other Fraud
☐ 371 Truth in Lending
☐ 380 Other Personal Property Damage
☐ 385 Property Damage Product Liability

Bankruptcy
☐ 422 Appeal 27 USC 158
☐ 423 Withdrawal 28 USC 157

Prisoner Petitions
☐ 535 Death Penalty
☐ 540 Mandamus & Other
☐ 550 Civil Rights
☐ 555 Prison Conditions
☐ 560 Civil Detainee – Conditions of Confinement

Property Rights
☐ 820 Copyrights
☐ 830 Patent
☐ 840 Trademark

Federal Tax Suits
☐ 870 Taxes (US plaintiff or defendant)
☐ 871 IRS-Third Party 26 USC 7609

Forfeiture/Penalty
☐ 625 Drug Related Seizure of Property 21 USC 881
☐ 690 Other

Other Statutes
☐ 375 False Claims Act
☐ 376 Qui Tam (31 USC 3729(a))
☐ 400 State Reapportionment
☐ 430 Banks & Banking
☐ 450 Commerce/ICC Rates/etc.
☐ 460 Deportation
☐ 462 Naturalization Application
☐ 465 Other Immigration Actions

☐ 470 Racketeer Influenced & Corrupt Organization
☐ 480 Consumer Credit
☐ 490 Cable/Satellite TV
☐ 850 Securities/Commodities/ Exchange
☐ 896 Arbitration
☐ 899 Administrative Procedure Act/Review or Appeal of Agency Decision
☐ 950 Constitutionality of State Statutes
☐ 890 Other Statutory Actions (if not administrative agency review or Privacy Act)

○ G. *Habeas Corpus/ 2255* ☐ 530 Habeas Corpus – General ☐ 510 Motion/Vacate Sentence ☐ 463 Habeas Corpus – Alien Detainee	○ H. *Employment Discrimination* ☐ 442 Civil Rights – Employment (criteria: race, gender/sex, national origin, discrimination, disability, age, religion, retaliation) *(If pro se, select this deck)*	○ I. *FOIA/Privacy Act* ☐ 895 Freedom of Information Act ☐ 890 Other Statutory Actions (if Privacy Act) *(If pro se, select this deck)*	○ J. *Student Loan* ☐ 152 Recovery of Defaulted Student Loan (excluding veterans)
○ K. *Labor/ERISA (non-employment)* ☐ 710 Fair Labor Standards Act ☐ 720 Labor/Mgmt. Relations ☐ 740 Labor Railway Act ☐ 751 Family and Medical Leave Act ☐ 790 Other Labor Litigation ☐ 791 Empl. Ret. Inc. Security Act	○ L. *Other Civil Rights (non-employment)* ☐ 441 Voting (if not Voting Rights Act) ☐ 443 Housing/Accommodations ☐ 440 Other Civil Rights ☐ 445 Americans w/Disabilities – Employment ☐ 446 Americans w/Disabilities – Other ☐ 448 Education	○ M. *Contract* ☐ 110 Insurance ☐ 120 Marine ☐ 130 Miller Act ☐ 140 Negotiable Instrument ☐ 150 Recovery of Overpayment & Enforcement of Judgment ☐ 153 Recovery of Overpayment of Veteran's Benefits ☐ 160 Stockholder's Suits ☐ 190 Other Contracts ☐ 195 Contract Product Liability ☐ 196 Franchise	○ N. *Three-Judge Court* ☐ 441 Civil Rights – Voting (if Voting Rights Act)

V. ORIGIN

◉ 1 Original Proceeding ○ 2 Removed from State Court ○ 3 Remanded from Appellate Court ○ 4 Reinstated or Reopened ○ 5 Transferred from another district (specify) ○ 6 Multi-district Litigation ○ 7 Appeal to District Judge from Mag. Judge ○ 8 Multi-district Litigation – Direct File

VI. CAUSE OF ACTION (CITE THE U.S. CIVIL STATUTE UNDER WHICH YOU ARE FILING AND WRITE A BRIEF STATEMENT OF CAUSE.)
Clean Air Act, 42 U.S.C. 7604, action to compel agency action unreasonably delayed.

VII. REQUESTED IN COMPLAINT CHECK IF THIS IS A **CLASS ACTION** UNDER F.R.C.P. 23 **DEMAND $** **JURY DEMAND:** Check YES only if demanded in complaint YES ☐ NO ☒

VIII. RELATED CASE(S) IF ANY (See instruction) YES ☐ NO ☒ If yes, please complete related case form

DATE: 11/4/2016 **SIGNATURE OF ATTORNEY OF RECORD** _____

INSTRUCTIONS FOR COMPLETING CIVIL COVER SHEET JS-44
Authority for Civil Cover Sheet

The JS-44 civil cover sheet and the information contained herein neither replaces nor supplements the filings and services of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. Consequently, a civil cover sheet is submitted to the Clerk of Court for each civil complaint filed. Listed below are tips for completing the civil cover sheet. These tips coincide with the Roman Numerals on the cover sheet.

I. COUNTY OF RESIDENCE OF FIRST LISTED PLAINTIFF/DEFENDANT (b) County of residence: Use 11001 to indicate plaintiff if resident of Washington, DC, 88888 if plaintiff is resident of United States but not Washington, DC, and 99999 if plaintiff is outside the United States.

III. CITIZENSHIP OF PRINCIPAL PARTIES: This section is completed only if diversity of citizenship was selected as the Basis of Jurisdiction under Section II.

IV. CASE ASSIGNMENT AND NATURE OF SUIT: The assignment of a judge to your case will depend on the category you select that best represents the primary cause of action found in your complaint. You may select only one category. You must also select one corresponding nature of suit found under the category of the case.

VI. CAUSE OF ACTION: Cite the U.S. Civil Statute under which you are filing and write a brief statement of the primary cause.

VIII. RELATED CASE(S), IF ANY: If you indicated that there is a related case, you must complete a related case form, which may be obtained from the Clerk's Office.

Because of the need for accurate and complete information, you should ensure the accuracy of the information provided prior to signing the form.

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

ENVIRONMENTAL INTEGRITY PROJECT
1000 Vermont Avenue NW, Suite 1100
Washington, DC 20005,

FOOD & WATER WATCH
1616 P St. NW, Suite 300
Washington, DC 20036

CENTER FOR FOOD SAFETY
660 Pennsylvania Avenue SE, Suite 302
Washington, DC 20003,

HUMANE SOCIETY OF THE UNITED STATES
1255 23rd Street NW
Washington, DC 20037,

CLEAN WISCONSIN
634 West Main Street, #300
Madison, WI 53703,

IOWA CITIZENS FOR COMMUNITY IMPROVEMENT
2001 Forest Avenue
Des Moines, IA 50311, and

ASSOCIATION OF IRRITATED RESIDENTS
29389 Fresno Ave
Shafter, CA 93263

Plaintiffs,

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY and
REGINA McCARTHY, in her official capacity as Administrator,
1200 Pennsylvania Ave. NW
Washington, DC 20460

Defendants.

Case No.

COMPLAINT FOR DECLARATORY AND INJUNCTIVE RELIEF

Clean Air Act,
42 U.S.C. § 7604
and
Administrative Procedure Act,
5 U.S.C. §§ 702, 706

CERTIFICATE RULE LCvRule 7.1

I, the undersigned counsel of record for the Environmental Integrity Project, Iowa Citizens for Community Improvement, and Clean Wisconsin, certify that to the best of my knowledge and belief, the Plaintiffs in this matter have no parent companies, subsidiaries, or affiliates with any outstanding securities in the hands of the public.

These representations are made in order that the judges of this Court may determine the need for recusal.

DATED: 11/4/2016

By: _____

Abel Russ (District of Columbia Bar No. 1007020)
Environmental Integrity Project
1000 Vermont Avenue NW, Suite 1100
Washington, DC 20005
(802) 482-5379
(202) 296-8822 (facsimile)
aruss@environmentalintegrity.org
Attorney for Plaintiffs Environmental Integrity Project, Iowa Citizens for Community Improvement, and Clean Wisconsin

AO 440 (Rev. 06/12) Summons in a Civil Action

UNITED STATES DISTRICT COURT

for the

District of Columbia

ENVIRONMENTAL INTEGRITY PROJECT, et al.

Plaintiff(s)

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, et al.

Defendant(s)

Civil Action No.

SUMMONS IN A CIVIL ACTION

To: *(Defendant's name and address)* U.S. ENVIRONMENTAL PROTECTION AGENCY
1200 PENNSYLVANIA AVE., NW
WASHINGTON, DC 20460

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it) — or 60 days if you are the United States or a United States agency, or an officer or employee of the United States described in Fed. R. Civ. P. 12 (a)(2) or (3) — you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff or plaintiff's attorney, whose name and address are: Abel Russ
Environmental Integrity Project
1000 Vermont Ave. NW, Suite 1100
Washington, DC 20005

If you fail to respond, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

CLERK OF COURT

Date: _____

_____
Signature of Clerk or Deputy Clerk

Civil Action No.

PROOF OF SERVICE

(This section should not be filed with the court unless required by Fed. R. Civ. P. 4 (l))

This summons for *(name of individual and title, if any)* _____ was received by me on *(date)* _____ .

❒ I personally served the summons on the individual at *(place)* _____ on *(date)* _____ ; or

❒ I left the summons at the individual's residence or usual place of abode with *(name)* _____ , a person of suitable age and discretion who resides there, on *(date)* _____ , and mailed a copy to the individual's last known address; or

❒ I served the summons on *(name of individual)* _____ , who is designated by law to accept service of process on behalf of *(name of organization)* _____ on *(date)* _____ ; or

❒ I returned the summons unexecuted because _____ ; or

❒ Other *(specify):*

My fees are $ _____ for travel and $ _____ for services, for a total of $ 0.00 .

I declare under penalty of perjury that this information is true.

Date: _____

_____
Server's signature

_____
Printed name and title

_____
Server's address

Additional information regarding attempted service, etc:

Print Save As... Reset

AO 440 (Rev. 06/12) Summons in a Civil Action

UNITED STATES DISTRICT COURT

for the

District of Columbia

ENVIRONMENTAL INTEGRITY PROJECT, et al.

Plaintiff(s)

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, et al.

Defendant(s)

Civil Action No.

SUMMONS IN A CIVIL ACTION

To: *(Defendant's name and address)* REGINA MCCARTHY, ADMINISTRATOR OF THE US ENVIRONMENTAL PROTECTION AGENCY
1200 PENNSYLVANIA AVE., NW
WASHINGTON, DC 20460

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it) — or 60 days if you are the United States or a United States agency, or an officer or employee of the United States described in Fed. R. Civ. P. 12 (a)(2) or (3) — you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff or plaintiff's attorney, whose name and address are: Abel Russ
Environmental Integrity Project
1000 Vermont Ave. NW, Suite 1100
Washington, DC 20005

If you fail to respond, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

CLERK OF COURT

Date: _____

_____
Signature of Clerk or Deputy Clerk

Civil Action No.

PROOF OF SERVICE

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❒ I personally served the summons on the individual at *(place)* _____ on *(date)* _____ ; or

❒ I left the summons at the individual's residence or usual place of abode with *(name)* _____ , a person of suitable age and discretion who resides there, on *(date)* _____ , and mailed a copy to the individual's last known address; or

❒ I served the summons on *(name of individual)* _____ , who is designated by law to accept service of process on behalf of *(name of organization)* _____ on *(date)* _____ ; or

❒ I returned the summons unexecuted because _____ ; or

❒ Other *(specify):*

My fees are $ _____ for travel and $ _____ for services, for a total of $ 0.00 .

I declare under penalty of perjury that this information is true.

Date: _____

_____
Server's signature

_____
Printed name and title

_____
Server's address

Additional information regarding attempted service, etc:

Print Save As... Reset

AO 440 (Rev. 06/12) Summons in a Civil Action

UNITED STATES DISTRICT COURT

for the

District of Columbia

ENVIRONMENTAL INTEGRITY PROJECT, et al.

Plaintiff(s)

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, et al.

Defendant(s)

Civil Action No.

SUMMONS IN A CIVIL ACTION

To: *(Defendant's name and address)* LORETTA E. LYNCH
ATTORNEY GENERAL OF THE UNITED STATES
U.S. DEPARTMENT OF JUSTICE
950 PENNSYLVANIA AVE., NW
WASHINGTON, DC 20530

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it) — or 60 days if you are the United States or a United States agency, or an officer or employee of the United States described in Fed. R. Civ. P. 12 (a)(2) or (3) — you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff or plaintiff's attorney, whose name and address are: Abel Russ
Environmental Integrity Project
1000 Vermont Ave. NW, Suite 1100
Washington, DC 20005

If you fail to respond, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

CLERK OF COURT

Date: _____

_____
Signature of Clerk or Deputy Clerk

Civil Action No.

PROOF OF SERVICE

(This section should not be filed with the court unless required by Fed. R. Civ. P. 4 (l))

This summons for *(name of individual and title, if any)* _____ was received by me on *(date)* _____ .

❒ I personally served the summons on the individual at *(place)* _____ on *(date)* _____ ; or

❒ I left the summons at the individual's residence or usual place of abode with *(name)* _____ , a person of suitable age and discretion who resides there, on *(date)* _____ , and mailed a copy to the individual's last known address; or

❒ I served the summons on *(name of individual)* _____ , who is designated by law to accept service of process on behalf of *(name of organization)* _____ on *(date)* _____ ; or

❒ I returned the summons unexecuted because _____ ; or

❒ Other *(specify):*

My fees are $ _____ for travel and $ _____ for services, for a total of $ 0.00 .

I declare under penalty of perjury that this information is true.

Date: _____

_____
Server's signature

_____
Printed name and title

_____
Server's address

Additional information regarding attempted service, etc:

Print Save As... Reset

AO 440 (Rev. 06/12) Summons in a Civil Action

UNITED STATES DISTRICT COURT

for the

District of Columbia

ENVIRONMENTAL INTEGRITY PROJECT, et al.

Plaintiff(s)

v.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, et al.

Defendant(s)

Civil Action No.

SUMMONS IN A CIVIL ACTION

To: *(Defendant's name and address)* CHANNING D. PHILLIPS
UNITED STATES ATTORNEY FOR THE DISTRICT OF COLUMBIA
UNITED STATES ATTORNEY'S OFFICE
555 4TH STREET, NW
WASHINGTON, DC 20530

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it) — or 60 days if you are the United States or a United States agency, or an officer or employee of the United States described in Fed. R. Civ. P. 12 (a)(2) or (3) — you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff or plaintiff's attorney, whose name and address are: Abel Russ
Environmental Integrity Project
1000 Vermont Ave. NW, Suite 1100
Washington, DC 20005

If you fail to respond, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

CLERK OF COURT

Date: _____

_____
Signature of Clerk or Deputy Clerk

Civil Action No.

PROOF OF SERVICE

(This section should not be filed with the court unless required by Fed. R. Civ. P. 4 (l))

This summons for *(name of individual and title, if any)* _____ was received by me on *(date)* _____ .

❒ I personally served the summons on the individual at *(place)* _____ on *(date)* _____ ; or

❒ I left the summons at the individual's residence or usual place of abode with *(name)* _____ , a person of suitable age and discretion who resides there, on *(date)* _____ , and mailed a copy to the individual's last known address; or

❒ I served the summons on *(name of individual)* _____ , who is designated by law to accept service of process on behalf of *(name of organization)* _____ on *(date)* _____ ; or

❒ I returned the summons unexecuted because _____ ; or

❒ Other *(specify):*

My fees are $ _____ for travel and $ _____ for services, for a total of $ 0.00 .

I declare under penalty of perjury that this information is true.

Date: _____

_____
Server's signature

_____
Printed name and title

_____
Server's address

Additional information regarding attempted service, etc:

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Exhibit A

BEFORE THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL INTEGRITY PROJECT, ASSOCIATION OF IRRITATED RESIDENTS, CABALLO CONCERNED CITIZENS GROUP, CENTER FOR FOOD SAFETY, CITIZENS FOR PENNSYLVANIA'S FUTURE, CLEAN WISCONSIN, CRAWFORD STEWARDSHIP PROJECT, ENVIRONMENTALLY CONCERNED CITIZENS OF SOUTH CENTRAL MICHIGAN, FOOD & WATER WATCH, THE HUMANE SOCIETY OF THE UNITED STATES, ILLINOIS CITIZENS FOR CLEAN AIR AND WATER, IOWA CITIZENS FOR COMMUNITY IMPROVEMENT, JOHNS HOPKINS CENTER FOR A LIVABLE FUTURE, MIDWEST ENVIRONMENTAL ADVOCATES, NORTHWEST ENVIRONMENTAL DEFENSE CENTER, RIO VALLE CONCERNED CITIZENS, SIERRA CLUB, SOCIALLY RESPONSIBLE AGRICULTURAL PROJECT, SUSTAIN RURAL WISCONSIN NETWORK, VERNON COUNTY ALLIANCE CONCERNED WITH ENVIRONMENTAL SAFETY, AND WATERKEEPER ALLIANCE,

Petitioners

v.

LISA P. JACKSON, ADMINISTRATOR
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Respondent.

PETITION FOR THE REGULATION OF AMMONIA AS A CRITERIA POLLUTANT UNDER CLEAN AIR ACT SECTIONS 108 AND 109

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I. EXECUTIVE SUMMARY

Congress enacted the Clean Air Act (CAA) to protect public health from diverse sources of air pollution, and empowered the Environmental Protection Agency (EPA) to establish regulations for different pollutants as scientific knowledge evolves, and the dangers they pose to human health and welfare become apparent. As this petition will establish, ambient ammonia pollution currently endangers human health and welfare, and EPA has an affirmative obligation to exercise its authority to regulate sources of ammonia emissions.

Ammonia gas, an air pollutant emitted in vast quantities by Concentrated Animal Feeding Operations (CAFOs), meets the criteria for listing as a CAA criteria pollutant, because ammonia emissions from numerous CAFOs and other sources "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare." CAA § 108. The predominantly rural nature of this pollution does not limit EPA"s authority to regulate; in fact, courts have made clear that even localized, site-specific, and infrequent ambient air pollution may create a public health risk that meets the § 108 standard and therefore warrants CAA regulation.

Several federal agencies, including EPA, have documented ammonia"s acute and chronic adverse health effects. Numerous peer-reviewed studies further demonstrate that ambient ammonia pollution in some rural communities near CAFOs currently exceeds recommended exposure levels, and citizens living near CAFOs experience adverse health effects from CAFO air pollution, including ammonia. Ammonia gas also reacts with other gases to form ammonium aerosols, inhalable small particles that further endanger public health.

This petition will also establish that ambient ammonia pollution endangers public welfare, which the CAA defines broadly to include quality of life, economic, aesthetic, and environmental values. Ammonia emissions detract from quality of life and decrease personal comfort and well-being in rural areas. Airborne ammonia re-deposits in and near waterways, adding nitrogen to ecosystems overloaded with nutrient pollution, reduces property values, and impairs visibility in scenic areas. The petitioners respectfully request that EPA issue a timely response to this petition, make an endangerment finding for ammonia, designate ammonia as a criteria pollutant, and establish primary and secondary National Ambient Air Quality Standards (NAAQS) to protect public health and welfare with an adequate margin of safety.

II. INTRODUCTION

The Environmental Integrity Project, Association of Irritated Residents, Caballo Concerned Citizens Group, Center for Food Safety, Citizens for Pennsylvania"s Future, Clean Wisconsin, Crawford Stewardship Project, Environmentally Concerned Citizens of South Central Michigan, Food & Water Watch, the Humane Society of the United States, Illinois Citizens for Clean Air and Water, Iowa Citizens for Community Improvement, Johns Hopkins Center for a Livable Future, Midwest Environmental Advocates, Northwest Environmental

Defense Center, Rio Valle Concerned Citizens, Sierra Club, Socially Responsible Agricultural Project, Sustain Rural Wisconsin Network, Vernon County Alliance Concerned with Environmental Safety, and Waterkeeper Alliance (petitioners) hereby petition the EPA to regulate air emissions of ammonia (NH_3) as a criteria pollutant under the CAA, sections 108 and 109.[1] Ammonia meets the legal standard for listing as a criteria pollutant because numerous stationary sources currently emit ammonia, an air pollutant, into the ambient air at levels which may reasonably be anticipated to endanger public health and welfare.

Ammonia qualifies as a pollutant that endangers public health and welfare. Exposure to airborne ammonia can cause both short-term and chronic respiratory health effects, and the chemical is lethal at sufficiently high concentrations. In addition, ammonia re-deposits onto soils and into sensitive waterways, resulting in soil acidification and eutrophication, which are destructive to both terrestrial and aquatic ecosystems. The small particles ammonia forms in combination with other pollutants contribute to regional haze and further threaten public health, and ammonia"s odor adversely affects quality of life and property values.

While ammonia sources that exceed certain thresholds must report emissions under federal "right to know" laws,[2] the CAA currently does not meaningfully regulate ammonia emissions from the nation"s most significant sources. The CAA, EPA"s most appropriate and effective tool for regulating air emissions, does not include ammonia on either its list of hazardous air pollutants, established in § 112, or its list of criteria pollutants, established pursuant to §§ 108 and 109; nor does it establish New Source Performance Standards under § 111 for CAFOs, the industry sector responsible for the majority of U.S. ammonia emissions.

The health and welfare harms caused by ambient ammonia warrant EPA"s increased scrutiny and regulation. Although additional CAA programs likely apply to ammonia and other CAFO emissions, EPA should regulate ammonia as a criteria pollutant, because short-term and chronic ambient ammonia pollution threatens public health and welfare in rural communities throughout the U.S. Due to ammonia"s toxicological profile and the human health and ecological threats it poses, the petitioners submit this petition to EPA, requesting that the agency list ammonia as a criteria pollutant and issue primary and secondary NAAQS to protect public health and public welfare from ammonia pollution.

[1] 42 U.S.C. §§7408, 7409.

[2] EPA recently limited these emissions reporting requirements as well. Under EPA"s 2008 CERCLA/EPCRA Administrative Reporting Exemption for CAFOs, only the Emergency Planning and Community Right to Know Act (EPCRA) still requires reporting of ammonia and hydrogen sulfide emissions from CAFOs, and only by large CAFOs as defined under the Clean Water Act. *See* CERCLA/EPCRA Administrative Reporting Exemption for Air Releases of Hazardous Substances From Animal Waste at Farms, 73 Fed. Reg. 76,948, 76,951 (Dec. 18, 2008).

III. PETITIONERS

The petitioners are the Environmental Integrity Project, Association of Irritated Residents, Caballo Concerned Citizens Group, Center for Food Safety, Citizens for Pennsylvania"s Future, Clean Wisconsin, Crawford Stewardship Project, Environmentally Concerned Citizens of South Central Michigan, Food & Water Watch, the Humane Society of the United States, Illinois Citizens for Clean Air and Water, Iowa Citizens for Community Improvement, Johns Hopkins Center for a Livable Future, Midwest Environmental Advocates, Northwest Environmental Defense Center, Rio Valle Concerned Citizens, Sierra Club, Socially Responsible Agricultural Project, Sustain Rural Wisconsin Network, Vernon County Alliance Concerned with Environmental Safety, and Waterkeeper Alliance.

The Environmental Integrity Project (EIP) is a nonpartisan, nonprofit organization established in March of 2002 by former EPA enforcement attorneys to advocate for more effective enforcement of environmental laws. CAFO pollution, one of EIP"s focal issues, contributes a controlling share of the total ammonia air emissions in the United States. EIP has an interest in protecting the environment from ammonia emissions released from CAFOs and other sources, as these emissions threaten human health and welfare, air quality, and water quality.

The Association of Irritated Residents (AIR) is an unincorporated non-profit with members throughout the San Joaquin Valley (SJV). On the basis of air quality issues, AIR has fought the local growth in dairy CAFOs in the SJV. For many years AIR has requested that the San Joaquin Valley Air Pollution Control District regulate ammonia as a precursor to $PM_{2.5}$ or ammonium nitrate. Wintertime $PM_{2.5}$ levels in Kern County, at the southern end of the SJV, are the worst in the nation.

Caballo Concerned Citizens Group (CCCG) is a grassroots community group of more than 1,000 New Mexicans. CCCG formed in response to a mega-dairy that attempted to locate in a region with shallow groundwater and vulnerable artesian wells, and within dangerous proximity to the Caballo Reservoir, the Rio Grande River, and pristine state parks. CCCG members living near animal factories cannot drink water from their wells or breathe the air in their homes due to these facilities" unregulated pollution, including ammonia.

Established in 1997, The Center for Food Safety (CFS) is a non-profit, membership organization that works to protect human health and the environment by curbing the proliferation of harmful food production technologies and by promoting organic and other forms of sustainable agriculture. CFS represents over 160,000 members throughout the country that are concerned about the impacts of factory farming on human health, animal welfare, and the environment. CFS believes that EPA must regulate ammonia and other pollutants from factory farms in order to protect human health and the environment and create a healthier, safer food supply.

Citizens for Pennsylvania's Future (PennFuture) works for a healthy environment, clean energy, and a sound economy. PennFuture litigates and advocates sound statewide policies to reduce air pollution from all sources, including agriculture.

Clean Wisconsin protects Wisconsin"s clean water and air and advocates for clean energy by being an effective voice in the state legislature and by holding elected officials and polluters accountable. Clean Wisconsin"s mission is to protect the special places that make Wisconsin such a wonderful place to live, work and play.

Crawford Stewardship Project is a grassroots community organization that works to protect the environment of Crawford County, Wisconsin from threats such as those posed by CAFOs and to promote sustainable land use, local control of natural resources, and environmental justice.

Environmentally Concerned Citizens of South Central Michigan (ECCSCM) supports vanguard, responsible agriculture, farming that looks ahead to the next generations, preserves biodiversity, raises animals in a healthy environment, does no harm to its neighbors, enhances the natural assets of living communities, and protects our natural resources – air, soils, groundwater, streams, and lakes. As family farmers and neighbors, ECCSCM believes agriculture must take responsibility for its actions in rural communities. CAFOs have failed us. They have damaged our farming communities, degraded our natural resources, and polluted our watersheds. ECCSCM believes that ammonia must be regulated to protect our communities, young and old.

Food & Water Watch is a national nonprofit advocacy organization that advocates for common sense policies that will result in healthy, safe food and access to safe and affordable drinking water. The issue of industrialized livestock production is a core part of Food & Water Watch"s work. Food & Water Watch has worked since 2005 to change federal and state policy on CAFOs and also works to educate the public on the variety of impacts these facilities have on public health and the environment.

The Humane Society of the United States (HSUS) is a national and international non-profit charitable organization that works to reduce suffering and improve the lives of all animals. The HSUS maintains its headquarters in Washington, D.C., and has offices, affiliates, or staff in 25 states, the District of Columbia, and five foreign countries. Through its policy, legislative, litigation, and grass-roots activities, the HSUS has become the nation"s largest and most effective animal protection organization, with more than 11 million members and constituents. The HSUS actively advocates against practices that harm all animals, including practices that result in unhealthy levels of pollutants being discharged into farm animal and wildlife habitats. HSUS has actively campaigned to regulate air pollutants being discharged by CAFOs through efforts with the EPA, in Congress, and in the Courts. Members of HSUS in the Lathrop, California community teamed up with the HSUS to bring a suit against a large chicken CAFO

that emits toxic levels of ammonia into their neighborhood and HSUS has petitioned the EPA to list and regulate CAFOs under the Clean Air Act. In the course of HSUS cases, experts have documented ambient ammonia levels above recommended health limits in the local community.

Illinois Citizens for Clean Air and Water (ICCAW) is a state-wide coalition of family farmers and community groups advocating for sound policies and practices that protect the environment, human health, and rural quality of life from the impacts of large-scale, industrialized livestock production facilities in Illinois. A majority of its members are family farmers and rural residents that live near large-scale livestock facilities that have been adversely impacted by the problems they create. The regulation of ammonia emissions from CAFOs is of particular concern to ICCAW because of the human health risks neighbors experience from exposure.

Iowa Citizens for Community Improvement (Iowa CCI) is a 36-year-old statewide non-profit grassroots organization. Iowa CCI has led the fight against factory farms in Iowa for the past 15 years and has pushed for better environmental and permitting laws for factory farms on the state and national level – including the first clean air standards established for ammonia and hydrogen sulfide in the state of Iowa.

The Johns Hopkins Center for a Livable Future, based at the Bloomberg School of Public Health, conducts and funds research that increases knowledge about the complex interactions among diet, health, food production and the natural environment. The Center has over a decade of experience researching the public health impacts of industrial food animal production. Research has provided strong evidence that the complex mixtures of AFO air pollutants impact health of surrounding communities. The release of ammonia from these facilities and from land applied animal waste contributes to population exposures. Given this, there is strong justification for EPA to add ammonia as a criteria pollutant and develop ambient standards aimed at protecting public health.

Midwest Environmental Advocates (MEA) is a non-profit environmental law center, founded in 1999, which provides legal services for the under-represented and advocates for the public‟s right to clean air, land and water. MEA represents communities negatively affected by air and water pollution, including ammonia pollution, from CAFOs. MEA‟s clients have experienced many of the health impacts associated with ammonia including respiratory problems, dizziness, nausea, and burning eyes.

The Northwest Environmental Defense Center (NEDC) is an independent, nonprofit organization working to protect the environment and natural resources of the Pacific Northwest. NEDC has an interest in protecting the region‟s air quality and water quality from CAFO ammonia pollution. For example, NEDC has worked to protect the environment of the Columbia River Gorge, where ammonia emissions from CAFOs have contributed to haze.

Rio Valle Concerned Citizens (RVCC) is a community group organized by citizens in 2010, and is part of a New Mexico Dairy Coalition that works to protect the state‟s groundwater from dairy pollution. As a community living near a CAFO, RVCC has an interest in bringing ammonia pollution down to a safe level. RVCC believes that CAFOs should monitor the amount of ammonia they emit and the health effects our community residents are living with because of ammonia pollution, and be responsible for reducing ammonia pollution to a safe level.

Since 1892, the Sierra Club has been working to protect communities, wild places and the planet. With 1.4 million members and supporters, it is the largest grassroots environmental organization in the United States. The Sierra Club has long been involved in public education, advocacy and litigation to reduce pollution from CAFOs.

Socially Responsible Agricultural Project (SRAP) is a unique organization dedicated to assisting rural communities facing economic strife to help them discover local solutions which will help them thrive once again. Established in 1997, this nonprofit organization has assisted over 750 communities and groups in the United States and Canada that have been impacted by the negative effects of industrial agriculture.

Sustain Rural Wisconsin Network (SRWN) is a statewide coalition of organizations and individuals working together to understand and influence impacts of CAFOs on rural Wisconsin communities. SRWN supports actions to promote environmentally sound, socially responsible farming practices that assure clean air and water and safe local food production for the future. SRWN also works to encourage the diversity and vitality of Wisconsin‟s rural family farms and communities.

Vernon County Alliance Concerned with Environmental Safety (ACES) successfully organized to protect its community from a 3,200 head factory dairy proposed by an out-of-state developer. ACES‟ mission is to ensure that the environment, economy, and health are preserved and protected in the design and location of business and industry in Vernon County, Wisconsin.

Waterkeeper Alliance is an international nonprofit organization representing the interests of its nearly 200 member watershed groups. Waterkeeper, along with each of its member groups, is dedicated to the preservation and protection of waterbodies and their neighboring communities. Aligned with this mission, Waterkeeper is concerned with the impacts of concentrated animal production on public health and the environment, and it seeks to reduce these impacts by actively advocating for the control of animal waste pollution, and for the promotion of sustainable agriculture.

IV. LEGAL AUTHORITY FOR REGULATING AMMONIA

The CAA provides EPA with the legal authority required to regulate ammonia. Congress directed EPA to designate pollutants that endanger public health or welfare as criteria pollutants, and to establish protective primary and secondary National Ambient Air Quality Standards for these pollutants, under §§ 108 and 109 of the CAA.

Section 108 sets out the requirements for establishing and regulating criteria pollutants:

> (a) Air Pollutant List; publication and revision by Administrator; issuance of air quality criteria for air pollutants
> (1) For the purpose of establishing national primary and secondary ambient air quality standards, the Administrator shall within 30 days after December 31, 1970, publish, and shall from time to time thereafter revise, a list which includes each air pollutant---
> (A) emissions of which, in his judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare;
> (B) the presence of which in the ambient air results from numerous or diverse mobile or stationary sources; and
> (C) for which air quality criteria had not been issued before December 31, 1970, but for which he plans to issue air quality criteria under this section.

This petition will demonstrate that ammonia meets all of the CAA statutory requirements for regulation under § 108 because: 1) it is a pollutant, 2) emissions of which may reasonably be anticipated to endanger public health and welfare, 3) the presence of which results from numerous stationary sources (primarily CAFOs), and 4) for which no air quality criteria have been issued.

Once EPA lists a pollutant under § 108, the listing triggers § 109, which sets the schedule for promulgating NAAQS[3] and requires EPA to establish primary and secondary standards sufficient to protect public health and welfare. EPA has only designated six criteria pollutants: 1) carbon monoxide, 2) nitrogen dioxide, 3) ozone, 4) lead, 5) sulfur dioxide, and 6) particulate matter (both $PM_{2.5}$ and PM_{10}). However, the wording of § 109(d), which requires EPA to review the NAAQS every five years and "promulgate such new standards as may be appropriate in accordance with section 7408 [108]," makes clear that Congress anticipated the list should evolve as new scientific studies emerge and new pollutants qualify for listing. Furthermore,

[3] Section 109 states "[n]ot later than December 31, 1980, and at five-year intervals thereafter, the Administrator shall complete a thorough review of the criteria published under section 7408 of this title and the national ambient air quality standards promulgated under this section and shall make such revisions in such criteria and standards and promulgate such new standards as may be appropriate in accordance with section 7408 of this title and subsection (b) of this section. The Administrator may review and revise criteria or promulgate new standards earlier or more frequently than required under this paragraph." CAA § 109(d)(1).

courts have established that § 109(d) gives rise to a mandatory duty for EPA to regulate a pollutant once it satisfies the statutory requirements of § 108.[4]

Under §109(d), the Administrator and independent scientific review committee must re-evaluate both the list of criteria pollutants and the NAAQS in five-year intervals, but may promulgate new standards more frequently in its discretion. Due to ammonia's ongoing adverse effects on public health and welfare, the petitioners urge EPA to take prompt action in response to this petition.

V. EPA SHOULD REGULATE AMMONIA AS A CRITERIA POLLUTANT UNDER CAA SECTION 108

EPA should make an endangerment finding and designate ammonia as a criteria pollutant, because it meets the statutory requirements for regulation. Ammonia is a pollutant, emissions of which endanger public health and welfare, the presence of which results from numerous stationary sources (CAFOs), and for which no air quality criteria have been issued.

A. Ammonia meets the CAA definition of an air pollutant

CAA section 108(a)(1) only applies to the regulation of air pollutants. Ammonia clearly meets the CAA § 302(g) definition of an air pollutant: "any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive (including source material, special nuclear material, and byproduct material) substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term „air pollutant" is used."

The term "air pollutant" has been given a broad and "sweeping" interpretation by the Supreme Court.[5] Ammonia gas meets the CAA's definition because, as this petition will establish, it causes harm to public health and the natural environment when numerous stationary sources, including CAFOs, steel mills, and refineries, emit it into the ambient air. EPA currently regulates airborne ammonia under CERCLA as a hazardous substance, and under EPCRA as an extremely hazardous substance,[6] and the Agency for Toxic Substances and Disease Registry (ATSDR) characterizes ammonia as a toxin because exposure to airborne ammonia can result in severe respiratory effects. EPA also recognizes ammonia's role as a fine particulate matter

[4] *See* discussion *infra* Section VIII.

[5] *Massachusetts v. EPA*, 549 U.S. 497 (2007) at 527. The court places emphasis on the use of the word "any" air pollutant.

[6] 40 C.F.R. §§ 302.4–302.5, 355.40, App. A to § 355 (2008).

precursor pollutant.[7] Thus ambient ammonia gas is air pollution, and ammonia emitted into the air is an air pollutant under the CAA.

B. Ammonia emissions cause and contribute to air pollution which may reasonably be anticipated to endanger both public health and welfare

Under CAA § 108(a)(1)(A), to qualify as a criteria pollutant, ammonia must cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. This petition presents extensive evidence to support a finding that ammonia endangers both public health and public welfare, and that ammonia emissions from numerous stationary sources currently give rise to ambient ammonia concentrations harmful to human health and quality of life, soil and water quality, visibility, and property values.

1. Ammonia emissions endanger public health

The CAA requires EPA to establish NAAQS for an air pollutant if the agency determines that the pollutant can be reasonably anticipated to endanger public health. Although the CAA and its implementing regulations do not define public health, the Supreme Court has affirmed its broad and common sense meaning, declaring it as simply "the health of the public."[8] The World Health Organization has also established a widely accepted definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[9] In addition, Black"s Law Dictionary (8th ed. 2004) defines both health: it defines health – "the state of being sound or whole in body, mind, or soul" and "freedom from pain or sickness" – and public health – "the health of the community at large."

Ammonia pollution threatens public health in numerous ways encompassed by these broad definitions. Threats to public health from ambient ammonia include increased risk of respiratory symptoms, eye and nose irritation, and other physical discomfort, as well as more severe health effects. Ammonia also contributes to the health effects of the mixture of gases in CAFO air emissions, which studies have linked to respiratory symptoms as well as headaches, nausea, and increased incidence of infant mortality. If certain communities face a disproportionate and substantial risk of adverse health effects from airborne ammonia, EPA may – and should – find that ammonia warrants regulation as a criteria pollutant. Extensive research conducted on both human and animal subjects over several decades establishes that ammonia emissions endanger human health. Indeed, several federal agencies, including EPA, have recognized this threat by establishing health standards or recommended exposure limits to protect workers and others exposed to airborne ammonia. CAFO emissions research further shows that airborne ammonia levels in some communities currently exceed relevant health benchmarks, demonstrating that ammonia is reasonably anticipated to endanger public health.

[7] *See* discussion *infra* Section V.B.1.iii.e.
[8] *Whitman v. American Trucking Ass'n*, 531 US 457, 466 (2001).
[9] World Health Organization (1948), http://www.who.int/about/definition/en/print.html.

i. EPA should regulate ammonia under the CAA because ammonia exposure causes significant adverse health effects

Ammonia's health effects have been thoroughly documented by the ATSDR, part of the Department of Health and Human Services, as well as the National Academy of Sciences, universities, and other federal agencies. ATSDR assessed "all relevant [ammonia] toxicologic testing and information that has been peer-reviewed" in drafting its Toxicological Profile for Ammonia.[10] EPA employs a similarly thorough review of ammonia health research, the National Academy of Sciences' Acute Exposure Guideline Levels (AEGL) report for ammonia.[11] The National Advisory Committee established to draft this report was tasked to "identify, review, and interpret relevant toxicologic and other scientific data" and establish acute exposure guidelines for ammonia and other "high-priority, acutely toxic chemicals."[12] Two Iowa universities have also compiled significant published research on the human health effects of ammonia gas exposure, which they reported in the 2002 Iowa CAFO Air Quality Study.[13] These three peer-reviewed documents compile and evaluate decades of accidental ammonia exposure case studies as well as human and animal irritation, exposure, and lethality studies.[14]

Depending on the concentration, duration of exposure, and sensitivity of the individual exposed, ammonia exposure causes a range of effects including odor detection, nasal, throat, and eye irritation, burns, scarring, and even death. The AEGL report for ammonia summarizes existing acute exposure research in the following chart.[15]

[10] ATSDR, *supra* note 6.
[11] Acute Exposure Guideline Levels for Selected Airborne Chemicals, Vol. 6, Committee on Acute Exposure Guideline Levels, Committee on Toxicology, Nat'l Research Council of the National Academies of Sciences, *available at* http://www.epa.gov/oppt/aegl/pubs/ammonia_final_volume6_2007.pdf [hereinafter Ammonia AEGL Report].
[12] Ammonia AEGL Report at 4.
[13] IOWA STATE UNIV. & UNIV. OF IOWA STUDY GROUP, IOWA CONCENTRATED ANIMAL FEEDING OPERATIONS AIR QUALITY STUDY (2002) at 123 [hereinafter Iowa Study], *available at* http://www.public-health.uiowa.edu/ehsrc/CAFOstudy.htm. *See also* discussion of Iowa Study *infra* Section V.B.1.ii.d.
[14] ATSDR at 102; Ammonia AEGL Report at 59; Iowa Study at 123-24.
[15] Excerpted from Ammonia AEGL Report, Table 2-5, at 77-78.

SUMMARY OF NONDISABLING AND REVERSIBLE EFFECTS OF INHALED AMMONIA IN HUMANS		
Concentration	**Duration of Exposure**	**Effect**
5 ppm	3 hours, with rest and exercise for 1.5 hours each	Subjective rating of eye discomfort and smell, headache, dizziness, and "feeling of intoxication" significantly greater than of controls; sensory adaptation to odor; no exposure-related change in pulmonary function, increase in nasal cells, no increase in exhaled NO, and no alteration in bronchial response to methacholine.
25 ppm	3 hours, with rest and exercise for 1.5 hours each	Subjective rating of eye, upper respiratory, and throat irritation, smell, headache, dizziness, and "feeling of intoxication" significantly greater than of controls; no sensory. Adaptation to odor; no exposure-related change in pulmonary function, increase in nasal cells, no increase in inhaled NO, and no alteration in bronchial response to methacholine.
30 ppm	10 minutes	Odor was moderately intense to highly penetration; irritation was faint or not detectable.
32 ppm	5 minutes	Nasal Dryness.
50 ppm	5 minutes	Nasal Dryness.
50 ppm	10 minutes	Highly penetrating odor; moderate irritation.
50 ppm	30 minutes	Moderately intense odor; moderate irritation to eyes and nose; mild irritation to throat and chest; slight urge to cough; slight general discomfort.
50 ppm	1 hour	Highly intense odor; moderate irritation to eyes, nose, throat, and chest; mild urge to cough; slight general discomfort.
50 ppm	2 hours	Offensive odor; moderate irritation to eyes, nose, throat, and chest, mild urge to cough; mild general discomfort.
72 ppm	5 minutes	Nasal, eye, and throat irritation.
80 ppm	30 minutes	Highly intense odor; highly intense eye and nose irritation; moderate throat and chest irritation; mild urge to cough; moderate general discomfort.
80 ppm	1 hour	Highly intense odor; moderate eye, nose, throat, and chest irritation; mild urge to cough; moderate general discomfort.

80 ppm	2 hours	Highly intense odor; highly intense eye, nose, throat, and chest irritation; highly intense urge to cough; and moderate general discomfort.
100 ppm	5-30 seconds	Significant increase in nasal airway resistance, but atopic subjects, including asthmatics, responded similarly to the nonatopic subjects.
100 ppm	2-6 hours/day, 5 weeks	No adverse effects on respiratory function and no increase in frequency of eye, nose, or throat irritation.
110 ppm	30 minutes	Highly intense odor, highly intense eye, nose throat, and chest irritation, mild urge to cough; moderate general discomfort.
110 ppm	1 hour	Highly intense odor; highly intense eye, nose, throat, and chest irritation; moderate urge to cough, moderate general discomfort
110 ppm	2 hours	Highly intense odor; highly intense eye and nose irritation; urge to cough; general discomfort
140 ppm	30 minutes	Highly intense odor; unbearable eye, nose, throat, and chest irritation; mild urge to cough; moderate general discomfort.
140 ppm	1 hour	Highly intense odor; unbearable eye, nose, throat, and chest irritation; moderate urge to cough; moderate general discomfort.
140 ppm	2 hours	Highly intense odor; unbearable eye and nose irritation; highly intense throat and chest irritation; highly intense urge to cough; unbearable general discomfort
143 ppm	5 minutes	Nose, eye, throat, and chest irritation; lacrimation.
500 ppm	15-30 minutes	Nose and throat irritation; nasal dryness and stuffiness; excess lacrimation; hyperventilation; unbearable.
570 ppm	Single Breath	Threshold for reflex glottis closure, 21 to 30-year-old subjects.
1000 ppm	Single Breath	Threshold for reflex glottis closure, 60-year-old subjects.
1000 ppm	NR	Immediate urge to cough.
1790 ppm	Single Breath	Threshold for reflex glottis closure, 86 to 90-year-old subjects.

Humans detect ammonia odor at concentrations ranging from 5 to 53 parts per million (ppm), and the odor can become "highly penetrating" at 50 ppm after 10 minutes of exposure.[16] One third of the volunteers in one human exposure study experienced irritation after just 10 minutes of exposure to 30 ppm ammonia.[17] The same study showed that eye, nose, throat, and chest irritation become moderate after a 30-minute exposure to 50 ppm and can become "highly intense" after a 30-minute exposure to 80 ppm.[18] At concentrations of 50 ppm, ammonia exposure can lead to throat irritation, mucous production, and cough.[19] At heightened concentrations, ammonia's effects exceed odor and irritation, and cause actual damage to the respiratory system. This damage may include tracheal and nasopharyngeal burns, and bronchiolar/alveolar swelling.[20]

Non-fatal effects of acute exposures to high concentrations of ammonia can be long-lasting, and even permanent. One case study considered in ATSDR's Toxicological Profile monitored the health effects on three men who had been acutely exposed to ammonia gas; the men subsequently reported several symptoms, including burning of the skin, eyes, and throat.[21] The men also showed signs of stressed airways as evidenced by wheezing and cough. More than two years later, the researchers re-evaluated the men and found continuing symptoms of restrictive lung disease.[22] Another case study considered by ATSDR followed a man who, 12 years after exposure to ammonia gas, still suffered from recurrent bronchial infections as well as cough and exertional dyspnea, or shortness of breath while exercising.[23]

The Toxicological Profile also documents accidents involving exposure to ammonia that resulted in neurological impacts such as blurred vision, muscle weakness, decreased deep tendon reflexes, and loss of consciousness.[24] Due to ammonia's solubility in water, ocular effects such as inflammation of the eyes and swelling of the eye-lids can occur with exposure to airborne ammonia.[25] Ammonia's solubility also allows it to quickly absorb into the upper airways, where it can damage the epithelial cells.[26]

In addition, ammonia inhalation can cause fatal burns and infections.[27] According to ATSDR, ammonia becomes acutely lethal at concentrations of 5,000-10,000 ppm.[28] These levels

[16] Ammonia AEGL Report at 59-60.
[17] *Id.* at 60.
[18] *Id*.
[19] *Id*. *See also* Iowa Study at 123.
[20] ATSDR at 16.
[21] *Id*. at 48.
[22] *Id*.
[23] *Id*.
[24] *Id*. at 55.
[25] *Id*. at 73.
[26] Iowa Study at 123.
[27] ATSDR at 25.
[28] *Id*.

of exposure often result in chemical burns and swelling of the skin, eyes, and respiratory tract.[29] At such high levels, studies have found that the ammonia actually scorches those exposed from the inside out, causing extensive internal damage such as swelling and congestion of the lungs, the stripping off of the epithelial lining of the bronchial wall, and ammonia burns across the upper body, face, and mouth.[30]

Ammonia"s health impacts persist even as it undergoes chemical transformations in the ambient air. Once in the air ammonia reacts to form ammonium aerosols;[31] both ammonia and these aerosol particles can have devastating effects on cardiovascular and hematological systems. Various non-human studies show that exposure to high concentrations of these compounds can cause high blood pressure, elevated pulse, bradycardia,[32] and even cardiac arrest.[33]

Specific health effects of acute ammonia exposure incidents depend on several factors, but these ammonia inhalation and exposure studies and literature reviews together document a scientifically accepted correlation between exposure to airborne ammonia and adverse respiratory and other health effects. These studies also consistently report odor, irritation, cough, and other respiratory symptoms for some individuals exposed to ammonia concentrations of approximately 30 ppm even over short periods of time.

Research further indicates that which symptoms a person experiences and which parts of the respiratory tract are affected depend not only on the concentration of ammonia, but also on whether exposure is acute or chronic. Acute exposures to low levels of ammonia affect the upper respiratory tract, whereas exposure to higher concentrations over longer periods of time affect both the upper and lower respiratory tracts and the alveolar capillaries in the lungs.[34] At sufficiently high concentrations, ammonia will bypass the upper airways and directly affect the lungs, causing inflammation of the lower lungs and pulmonary edema, or swelling.[35]

Although less research exists documenting the health effects of chronic ammonia exposures than of acute exposures, ATSDR based its long-term exposure recommendation on a 12-year case study of occupational exposure, from which the agency derived a no observable adverse effect level (NOAEL) of 9.2 ppm.[36] This petition will discuss additional studies of health and welfare effects from long-term ammonia exposure near CAFOs.

In short, ammonia released into the air causes both acute health effects and chronic diseases. However, though ammonia may be reasonably anticipated to endanger public health, EPA currently does not regulate airborne ammonia to protect the health of the general public.

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[29] *Id*.
[30] *Id*.
[31] *Id*. at 34.
[32] Slow heart beat; *see* Mayo Clinic, Bradycardia at http://www.mayoclinic.com/health/bradycardia/ds00947.
[33] ATSDR at 52.
[34] *Id*.
[35] Iowa Study at 123.
[36] *Id*. at 40.

The only enforceable ammonia standards currently in effect apply exclusively to workers; but as this petition will establish, non-workers near CAFOs and other ammonia sources also require protection from unsafe ambient levels of ammonia. The NAAQS program provides the best mechanism for this protection.

ii. Ammonia is widely recognized as a health threat

Based on ammonia"s well-documented and life-threatening health effects, EPA, ATSDR, the Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health (NIOSH) have taken steps to protect workers from dangerous exposures to ammonia and inform the public of the potential risks of exposure. Moreover, groups of experts have considered the health effects of ammonia from CAFOs in particular, and have recommended that EPA regulate ammonia under the CAA based on existing research. This section introduces several relevant health benchmarks, and discusses the merits and limitations of each with regard to assessing the health risk of ambient ammonia. It then discusses the Iowa Study of CAFO emissions and the Pew Commission report on industrial livestock production and their recommendations to protect communities from the health effects of ambient ammonia. This petition will analyze several studies of ammonia emissions from CAFOs, using these various existing and proposed health thresholds as indicators for the risk posed by current ammonia levels at the CAFO vent and in the ambient air.

a. Acute Exposures: EPA's Acute Exposure Guideline Levels

EPA has already adopted both short- and long-term ammonia heath guidelines. The first is a system of short-term pollution exposure limits, known as Acute Exposure Guideline Levels (AEGLs), established to guide response actions when people experience a rare – even "once-in-a-lifetime" – short-term, accidental exposure to a toxic chemical.[37] The National Advisory Committee reviewed relevant studies and data, then used these studies to establish threshold exposure limits "below which adverse health effects are not likely to occur."[38]

EPA divides the AEGLs into three levels: AEGL-1, the concentration above which the public, including susceptible individuals, could experience irritation or discomfort but no lasting effects; AEGL-2, the concentration above which the general public, including susceptible individuals, could experience permanent, serious adverse health effects and an inability to escape from the chemical threat; and AEGL-3, the concentration above which the general public, including susceptible individuals, could experience life-threatening adverse health effects or death.[39] EPA established several AEGL concentrations for each level, correlated with different exposure durations. The AEGL-1 for each of several acute-duration exposure times is 30 ppm,

[37] EPA, Acute Exposure Guideline Level Program, http://www.epa.gov/oppt/aegl/index.htm (last visited Mar. 18, 2011).
[38] Ammonia AEGL Report at 4.
[39] *Id*. at 4-5.

indicating that after as few as ten minutes, individuals may experience temporary, but adverse, health effects from breathing 30 ppm ammonia.[40] The following chart shows EPA's AEGLs for ammonia.[41]

Ammonia 7664-41-7 (Final)					
ppm					
	10 min	30 min	60 min	4 hr	8 hr
AEGL 1	30	30	30	30	30
AEGL 2	220	220	160	110	110
AEGL 3	2,700	1,600	1,100	550	390

The AEGLs provide one of the most comprehensive and scientifically rigorous reviews of existing human and animal research on the effects of ammonia exposure. Moreover, these guidelines consider the health effects on high-risk populations, rather than considering only effects on worker health as some other agency standards do. The AEGLs also demonstrate that EPA already recognizes ammonia's short-term health effects, even at moderate concentrations. Consequently, these guidelines provide a strong foundation from which EPA can establish short-term NAAQS that will protect public health and welfare from short-term elevations in ambient ammonia levels from sources such as CAFOs.

Although the AEGLs provide EPA with a comprehensive review of scientific research with which to regulate, ammonia NAAQS must be more protective than the AEGLs. These levels are set to protect the public from a *once-in-a-lifetime* exposure to ammonia, while many rural citizens breathe elevated CAFO ammonia emissions for varying time periods on a frequent basis for years, or even decades. Thus, while the AEGLs provide a useful starting point for CAA regulation, they do not provide adequate ambient air quality standards.

b. Ambient Exposures: EPA's Reference Concentration and ATSDR's Minimal Risk Levels

EPA has also considered and assessed the chronic effects of ammonia inhalation, and established a Reference Concentration (RfC) of 0.14 ppm to indicate a safe level of ammonia to breathe over the long term. EPA derived the RfC from the results of a long-term worker exposure study, which it then adjusted with uncertainty factors to better protect sensitive individuals and account for the lack of a robust data set.[42] This chronic exposure RfC provides a useful starting point for EPA to use in establishing a one-year or other long-term ambient standard that will protect public health from continuous low-level ammonia emissions.

[40] EPA, Acute Exposure Guideline Levels Ammonia Results, http://www.epa.gov/oppt/aegl/pubs/results88.htm (last visited Mar. 18, 2011).
[41] *Id*.
[42] ATSDR at 163.

As discussed above, ATSDR has also reviewed existing research on the effects of ammonia exposure on both humans and animals and has established health thresholds called Minimal Risk Levels (MRLs) for both acute and chronic inhalation exposure to ammonia.[43] Much like EPA's RfC, in determining MRLs for different substances, ATSDR considered the most susceptible individual and estimated "the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure."[44] Thus, ATSDR established the MRLs to identify the level above which daily exposure to airborne ammonia, in the absence of other pollutants, poses a health risk.

Based on its review of all available ammonia exposure research, ATSDR set its acute MRL for ammonia at 1.7 ppm for inhalation exposure of 14 days or fewer,[45] and set the chronic MRL at 0.1 ppm for inhalation exposure of 365 days or more.[46] Both threshold MRLs provide relevant points of reference when determining whether a specific ambient ammonia concentration could create a public health hazard. As this petition will discuss, studies provide evidence that citizens may be exposed to ammonia levels that exceed the MRLs in areas near even a single large CAFO. Moreover, ATSDR has observed respiratory health impacts from a single livestock facility work shift exposure to 7.9 ppm ammonia, but to isolate the effects of ammonia ATSDR specifically excluded this research when establishing the MRLs.[47] EPA should instead account for the increased health effects from mixed-pollutant exposures when considering safe ambient ammonia levels.

Some of the studies referenced in this petition, such as the Iowa Study discussed below, use the ATSDR's old chronic MRL of 0.3 ppm as the relevant ambient health threshold. As a result they may not conclude that observed ambient ammonia levels above 0.1 ppm pose a health threat. However, in 2004 ATSDR acknowledged that the study on which it had based the prior chronic MRL did not adequately represent all vulnerable populations and could not account for the lack of developmental and reproductive studies. To take this data gap into account, ATSDR used a modifying factor of three and adopted the current 0.1 ppm chronic MRL.[48] Thus, EPA should re-examine research conclusions based on the under-protective past MRL, with the new MRL in mind.

Between its own and ATSDR's established health thresholds, EPA already has much of the research necessary to establish protective NAAQS for acute, intermediate, and long-term ammonia exposure. However, research focused on CAFO emissions – the source of the majority of ammonia emissions in the U.S, but also a source of hydrogen sulfide, particulates, and hundreds of volatile organic compounds – indicates that adequately protective standards must

[43] ATSDR at 18-20.
[44] ATSDR, Minimal Risk Levels (MRLs) for Hazardous Substances, http://www.atsdr.cdc.gov/mrls/index.html (last visited Mar. 18, 2011).
[45] *Id*.
[46] *Id*. at 19.
[47] *Id*. at 18.
[48] *Id*. at 20.

also account for the additive or synergistic adverse health effects of multiple-pollutant exposures. EPA should consider multiple-pollutant effects when deciding whether and how to regulate ammonia under the CAA.

c. Worker Exposures: NIOSH's Recommended Exposure Limits and OSHA's Permissible Exposure Limit

The NIOSH, part of the Centers for Disease Control and Prevention, has established recommended exposure limits (RELs) for workers breathing ammonia pollution in the workplace. Similarly, OSHA has established a health standard for ammonia in the workplace. NIOSH recommends that employers should not expose workers to more than 25 ppm of ammonia averaged over a ten-hour period or 35 ppm averaged over a 15-minute period.[49] OSHA permissible exposure limits (PELs) are similar to NIOSH recommendations in that they are meant to protect workers. However, in the case of ammonia OSHA adopted a less stringent benchmark; its enforceable ammonia standard limits worker exposure to a maximum ammonia concentration of 50 ppm, averaged over an 8-hour time period.

NIOSH and OSHA based these exposure levels, unchanged since 1974, on a NIOSH literature review that included both human and animal ammonia exposure studies that were primarily conducted between the 1940s and mid-1960s.[50] This criteria document noted that at the time of publication, few or no studies on agricultural ammonia exposure existed.[51] When compared to ATSDR"s and the National Academy of Sciences" findings of health effects at low exposure levels, it becomes clear that NIOSH did not seek to avoid all adverse health impacts or ammonia irritation when recommending occupational exposure standards. Rather, the report sought to identify "exposure levels at which no employee will suffer impaired health or functional capacities or diminished life expectancy as a result of his work experience."[52] OSHA is not required to provide workers protection equal to that EPA must provide the public through its CAA authority.

The agencies recognized in 1989 that the OSHA PEL for ammonia did not adequately protect worker health and sought to adopt a more stringent PEL. The amended standard would have set a 15-minute short-term exposure level of 35 ppm through a "generic" rulemaking that covered more than 400 hazardous chemicals. However, the 11th Circuit vacated this rule on procedural grounds unrelated to the need for a more protective ammonia standard, holding that OSHA had failed to adequately support and explain each new standard in its record.[53] OSHA has not acted to strengthen the ammonia PEL since its rule was vacated. Thus, even OSHA has

[49] NIOSH, Pocket Guide to Chemical Hazards, http://www.cdc.gov/niosh/npg/npgd0028.html (last visited Mar. 18, 2011).
[50] *Criteria for a Recommended Standard…Occupational Exposure to Ammonia*, HEW Publication No. (NIOSH) 74-136 (1974), *available at* http://www.cdc.gov/niosh/74-136.html (last visited Mar. 18, 2011).
[51] *Id*. at 60-62.
[52] *Id*. at 22.
[53] *See AFL-CIO v. OSHA*, 965 F.2d 962 (11th Cir., 1992).

recognized that ammonia creates a greater threat to worker health and safety than its current PEL reflects.

Though some of these health benchmarks are under-protective and were never intended to protect the general population from ammonia exposure, and none take multiple pollutant exposures into account,[54] each can help EPA interpret existing data on ammonia air emissions from stationary sources such as CAFOs and establish safe ambient standards for airborne ammonia. Because ATSDR and EPA's health thresholds address health threats to the general public from both acute and chronic ammonia exposure, they serve best to analyze monitoring of ambient air near residences and public places. Conversely, because the NIOSH and OSHA exposure levels address health threats over shorter periods of time and with only workers in mind, they can provide a frame of reference for monitoring data collected at the source, such as CAFO vents, but have little value in assessing the public health threat posed by ambient ammonia.

d. Iowa's Joint University CAFO Air Quality Study

At the request of then-Iowa Governor and current U.S. Secretary of Agriculture Tom Vilsack, Iowa State University and the University of Iowa completed a significant joint report (the Iowa Study) on air emissions from CAFOs in 2002.[55] The Iowa Study reviewed and analyzed peer-reviewed studies on various aspects of these emissions, including the volume and nature of CAFO air emissions, the toxicology of pollutants released from CAFOs, and the community health and social impacts of CAFO emissions. The state tasked the study group with answering specific questions about CAFO air emissions; among them, the study set out to answer: "[b]ased on an analysis of peer-reviewed, duplicated, legitimate, and published scientific research, what would you recommend as Iowa or National consensus standards for any proposed substances to be regulated as emissions from CFOs?"[56]

The Study's authors answered this question with a significant recommendation; based on their review of credible CAFO emissions research, they concluded that EPA should regulate certain substances released from CAFOs – namely ammonia, hydrogen sulfide, and odor – under the CAA NAAQS program.[57] Based on this emissions research, as well as state ammonia standards, ATSDR and EPA recommendations, and research on the additive or synergistic effects of multiple pollutants in CAFO emissions, the Study recommends that protective

[54] Regardless whether EPA has considered additive effects of multiple-pollutant exposures in establishing NAAQS for criteria pollutants to date, the CAA requires EPA to list criteria pollutants if they "cause *or contribute to*" pollution that may endanger public health. CAA § 108(a)(1)(A). Thus EPA should consider the health effect of CAFO emissions as a whole when determining a safe level of ambient ammonia exposure.
[55] IOWA STATE UNIV. & UNIV. OF IOWA STUDY GROUP, IOWA CONCENTRATED ANIMAL FEEDING OPERATIONS AIR QUALITY STUDY (2002) at 123 [hereinafter Iowa Study], *available at* http://www.public-health.uiowa.edu/ehsrc/CAFOstudy.htm (last visited Mar. 18, 2011).
[56] Iowa Study at 8. The study uses the Iowa regulatory term "CFO" interchangeably with CAFO. *Id*. at 5.
[57] *Id*. at 8.

ammonia one-hour averages should not exceed 500 ppb (0.5 ppm) at the CAFO property line or 150 ppb (0.15 ppm) in residential and public use areas.[58]

While this ambient level very nearly matches EPA's RfC for ammonia, the Study recommends 0.15 ppm as a one-hour average limit, rather than a long-term limit, due to the complex effects of breathing numerous pollutants simultaneously. Thus, as a result of studying CAFO emissions specifically, and not simply examining ammonia gas in isolation, the Iowa Study emphasized the most typical route for ambient ammonia exposure and its researchers proposed a far more protective standard than any federal agency to date. EPA should consider the Iowa Study's peer-reviewed recommendations and findings when reviewing this petition.

e. Pew Commission Report on Industrial Farm Animal Production

In 2008, the Pew Commission on Industrial Farm Animal Production (PCIFAP), an independent project of Johns Hopkins Bloomberg School of Public Health and the Pew Charitable Trusts, released a similarly comprehensive report on the impacts of industrial livestock production. This report – "Putting Meat on the Table: Industrial Farm Animal Production in America" [59] (the Pew Commission Report) – compiled the published literature on a wide range of CAFO impacts, including air emissions and their effects on public health.

Among its recommendations, the Pew Commission Report concluded that "EPA should develop a standardized approach for regulating air pollution" from CAFOs under the CAA.[60] The Report also noted the complicated effects of mixed air pollutants found in CAFO emissions and the importance of considering these mixed exposures.[61] The Pew Commission Report analyzed the most current and comprehensive CAFO emissions and health research from across the globe, and EPA should consider its findings and recommendations when reviewing this petition.

The Pew and Iowa reports fill large information gaps left by federal agencies that have assessed ammonia's health impacts, both by focusing on ammonia's primary source – CAFOs – and by considering ammonia's effects when mixed with other hazardous pollutants. Moreover, both reports conclude that EPA should use the CAA to address the public health threats posed by ammonia and other CAFO emissions.

Taken together these standards, guidelines, and expert recommendations demonstrate that ammonia is a recognized toxic air pollutant that requires CAA regulation to protect the public

[58] *Id*. at 176.
[59] PEW COMMISSION ON INDUSTRIAL FARM ANIMAL PRODUCTION, PUTTING MEAT ON THE TABLE: INDUSTRIAL FARM ANIMAL PRODUCTION IN AMERICA (2008) [hereinafter Pew Commission Report], *available at* http://www.ncifap.org/ (last visited Mar. 18, 2011).
[60] *Id*. at 75.
[61] *Id*. at 69.

health. Even at low levels, acute and chronic exposures to ammonia gas pose significant health threats, and EPA should use this collective evidence base to establish protective NAAQS.

iii. EPA should regulate ammonia under the CAA because unsafe ambient levels of ammonia currently threaten public health

EPA should regulate ammonia under the Clean Air Act because studies show that CAFOs emit ammonia into the air at levels exceeding EPA and ATSDR benchmarks in the ambient air and exceeding NIOSH and OSHA benchmarks at the source, thereby threatening public health in certain areas. Though a limited number of peer-reviewed emissions studies exist, those available found dangerous ammonia concentrations that require regulation to protect nearby residents.

a. CAFO emissions generate ambient ammonia concentrations that exceed EPA's RfC and ATSDR's MRLs

EPA should regulate ambient ammonia because CAFOs emissions give rise to ambient ammonia concentrations that exceed EPA"s chronic exposure RfC and ATSDR"s acute and chronic MRLs, and that therefore may reasonably be anticipated to endanger public health. The agencies derived these benchmarks to identify the threshold level below which long-term exposure is thought to be safe, but above which uncertainty remains. Thus, when ambient ammonia levels exceed these thresholds, those exposed face a possible risk of adverse health effects. This threat can most appropriately be addressed through the NAAQS program.

To date, the most significant studies of ambient ammonia levels from CAFO emissions showed that some CAFOs do in fact cause unsafe ambient ammonia levels, even at significant distances from the facility. While researchers have conducted numerous studies of the health symptoms experienced due to CAFO emissions, and EPA has studied ammonia levels at the CAFO vent, very few studies have actually measured ammonia levels in the ambient air. Two significant studies discussed in this petition are ATSDR"s study of a Missouri hog CAFO and the University of Georgia"s study of a Georgia broiler CAFO.

Missouri Hog CAFO Study

In August of 2003, the ATSDR and the Missouri Department of Health and Senior Services (DHSS) released a CAFO ammonia emissions Health Consultation, reporting the results of an ammonia Exposure Investigation (EI) conducted by ATSDR and DHSS in a community near a large swine CAFO.[62] The agencies conducted the study in response to complaints by

[62] U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation, prepared by the Missouri Department of Health and Senior Services Section for Environmental Public Health, Health Consultation: Final Report on Exposure Investigation Findings, Valley View Concentrated Animal Feeding Operations (Aliases: Concentrated Animal Feeding Operations and Confined Animal Feeding Operations), Green Castle, Sullivan County, Missouri (2003) [hereinafter Missouri Health Consultation].

residents that the air emissions from the CAFO were adversely affecting respiratory health and quality of life.[63]

The investigation focused on ammonia emissions downwind from the Premium Standard Farms Valley View swine CAFO, which at the time had a permit to house 123,648 hogs.[64] Investigators sampled ammonia levels at 6 houses, which they selected based on the proximity of the house to the CAFO, the location of the house downwind from the CAFO, and the willingness of the homeowner to participate in the investigation.[65] The investigators monitored one outdoor and one indoor location at each house.[66] They placed sampling equipment at breathing zone height and monitored each location continuously for no less than 3 consecutive days during the 12 day study.[67] EPA and the Missouri Department of Natural Resources (MDNR) took concurrent samples at the same outside locations, as well as 12-hour time-weighted averages inside the homes, to compare with ATSDR"s results.[68] The study measured ammonia concentration in ppm and reported results as 24-hour maximum discrete measurements (each monitor"s highest measurement each day) and 24-hour averages.[69] ATSDR also surveyed 77 homes within a one-mile radius, and 39 homes between one and two miles from the CAFO, to evaluate residents" perceptions of odors and health symptoms.[70]

In the Health Consultation, ATSDR compared monitoring results with its former acute and chronic MRLs. This discussion will instead use the current MRLs, which ATSDR revised in 2004, as more pertinent benchmarks for possible health impacts.[71] Monitoring from all six of the studied houses resulted in ammonia levels of concern. 41 out of 46 of the study"s maximum discrete measurements, which were reported daily at each house both inside and outside, exceeded the chronic MRL of 0.1 ppm.[72] Daily maximum samples from inside houses 1032 and 1110 also exceeded the acute MRL of 1.7 ppm. Monitors in house 1032 recorded maximum discrete measurements of approximately 4.3 ppm, 2.0 ppm, and 2.0 ppm for Day 1, Day 2, and Day 3 respectively.[73] At 1.9 ppm, the maximum discrete measurement taken inside of house 1110 on Day 1 also exceeded the acute MRL.[74]

The results from the 24-hour averages also give cause for concern. While this study lasted only three days at each home, and ATSDR"s chronic MRL sets a health effects benchmark for exposure exceeding a year, 24-hour averages most closely indicate the amount of ammonia

[63] Missouri Health Consultation at 1.
[64] *Id*. at 2.
[65] *Id*. at 3.
[66] *Id*.
[67] *Id*.
[68] *Id*. at 2-3.
[69] *Id*. at 5-6.
[70] *Id*. at 3.
[71] *See* discussion *supra* Section V.B.1.ii.b.
[72] Missouri Health Consultation at 3.
[73] *Id*. at 6.
[74] *Id*.

these residents breathe on a daily basis. Thus, these averages can most meaningfully be compared with the chronic MRL and the RfC. All of the average measurements inside of houses 1028, 1032, and 1110 during the three-day period exceeded the chronic MRL.[75] In the absence of a longer-term study, all evidence indicates that residents downwind from large CAFOs may suffer health impacts from chronic low-level ammonia exposure.

Three factors in this study indicate that it under-represents the ammonia concentrations and risk faced by this and other rural communities. First, ATSDR acknowledges that the "downwind" homes studied were actually only downwind of the CAFO during approximately 10 percent of the monitoring period, and the Health Consultation also points out that ammonia concentrations were "significantly higher when wind was directed from the site to the monitor."[76] Though Valley View houses an enormous number of hogs, these residents experienced direct emissions only a small percent of the time and lived as far as a mile from the site; communities with CAFOs on multiple sides and that have CAFOs very nearby will likely face elevated ammonia concentrations more often. Second, ATSDR states that land application of manure took place during less than half of the monitoring period, and thus "the maximum period of exposure is not believed to have been attained during this EI."[77] Third, as EPA pointed out in its comments on the draft consultation, ammonia levels increase as wind speed decreases. The study did not take place during the season with lowest wind speeds, thus residents likely breathe higher ambient concentrations during much of the year.[78]

These limitations on the study, limits on the general applicability of ATSDR's MRLs, and ATSDR's use of a less protective and since-replaced chronic MRL in its study, likely contributed to the Health Consultation's conclusion that no apparent public health hazard existed near the houses at the time of the EI. However, as noted previously, EPA commented on the draft report and came to the *opposite* conclusion. In a memorandum written by EPA's Stationary Source Enforcement Branch of the Air Enforcement Division to the Director of the Missouri DHSS, EPA weighed in to "better inform the conclusions in the final report."[79]

EPA's memo acknowledged the complexity of CAFO air emissions, and contrasted the Valley View study with the 2002 Iowa Study.[80] EPA further suggested that the Iowa recommendations apply a more comprehensive analysis than the ATSDR MRLs alone because the Iowa Study considered numerous studies in addition to those relied on by ATSDR, including studies of the aggregate effect that mixed exposures can have on public health.[81] Consequently,

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[75] *Id*. at 5.
[76] *Id*. at 8.
[77] *Id*.
[78] EPA, Office of Enforcement and Compliance Assurance, Memorandum from Mario Jorquera to Scott Clardy, Comments on the Valley View Health Consultation, (Dec. 2002) [Hereinafter EPA Memo].
[79] EPA Memo at 1.
[80] *See* discussion *supra* Section V.B.1.ii.d.
[81] EPA Memo at 2. Note that this letter's discussion of the MRLs refers to the MRLs established in the 1990 ATSDR toxicological profile for ammonia, which predated the more protective chronic MRL adopted in 2004.

the memo emphasized the fact that, "during the Valley View field investigation, the [ATSDR] monitors recorded 60 occurrences of one-hour ammonia concentrations ranging from 153 ppb to 875 ppb, well in excess of the Iowa Study's recommended limit."[82] EPA pointed out that house 1032 was exposed to 10 of these high readings over a 20 hour period and that, in fact, every house studied reported elevated exposures.[83] As a result, EPA found that "the conclusion could be drawn that a *public health hazard* did exist at the time the Valley View data was acquired"[84] (emphasis in original).

EPA's emphasis on the one-hour concentrations measured outside and inside of the studied homes, as well as its adoption of the Iowa Study's far more protective recommendations, demonstrates that the agency understands ammonia's short-term, localized, and additive health effects. The results of the Valley View Health Consultation indicate potential health threats from both short-term and long-term exposure to CAFO ammonia emissions.

EPA should consider the results of the Missouri health consultation and draw on the findings in its own memo, which concluded that ambient ammonia emissions from a single Premium Standard Farms hog CAFO may have created a public health hazard for residents as far as a mile away. The fact that the Valley View CAFO exposed neighbors to ammonia concentrations above the ammonia MRLs and above the recommended exposure limit of the Iowa Report weighs heavily in favor of creating ambient standards for this pollutant, particularly in light of EPA's analysis of multiple pollutant effects, spikes in emissions at certain times of year, the effect of wind directions, and the scientific foundations of the Iowa Report.

Georgia Broiler CAFO Study

In 2009, researchers from the University of Georgia, Athens, released the results of the first study of measured ammonia concentrations in the ambient air near poultry houses.[85] The researchers compared their data with OSHA's and EPA's odor threshold values, as opposed to the health-based MRLs or RfC, which limits the value of the study's conclusions. However, when compared to the more relevant MRLs, RfC, and the Iowa Study's recommendations, the ammonia data collected indicate potential adverse health effects near large poultry facilities.

The researchers set out to measure ammonia concentrations at varying distances from one broiler operation, and to determine the effects of wind speed and direction on ambient ammonia levels.[86] The broiler CAFO studied had four houses, each with approximately 23,500 birds.[87] Monitors measured ammonia concentrations once per minute at various distances from the

[82] *Id*. at 2.
[83] *Id*.
[84] *Id*.
[85] B. D. Fairchild et. al, *Ammonia concentrations downstream of broiler operations*, 18 J. Appl. Poultry Res. 630 (2009), *available at* http://japr.fass.org/cgi/content/full/18/3/630 (last visited Mar. 18, 2011).
[86] *Id*. at 631.
[87] *Id*. at 631-32.

ventilation fans, from 100 to 500 feet, and reported results as 15-minute averages. Measurements were taken over two monitoring periods: a three-week period with measurements at 100-, 200-, and 300-foot distances; and a one-week period with measurements at 100-, 300-, and 500-foot distances. The latter study period included the farther-away monitoring location to account for increased emissions as the birds grew larger, producing more emissions and necessitating higher ventilation rates that create greater total air flow.[88]

Unsurprisingly, the highest ammonia concentrations were strongly correlated with proximity to the broiler houses as well as with times when the monitors were directly downwind of the ventilation fans. The monitors also recorded elevated concentrations during times of low wind speed.[89] After averaging 1,135 15-minute averages over the four-week study, the ammonia concentration at 100 feet from the facility was approximately 0.5 ppm for each study period, and the overall average at 300 feet exceeded 0.3 ppm for each study period. The final week of monitoring recorded an overall average concentration of approximately 0.25 ppm at 500 feet.[90]

While the researchers failed to discuss potential health impacts of their findings, instead comparing the data to EPA"s odor threshold limit of between 5 and 50 ppm, all of these overall averages exceed the chronic MRL, the RfC, and the Iowa Study"s recommended one-hour average limit – some by several times. Moreover, during the study the maximum 15-minute averages exceeded 2 ppm at all but the 500-foot monitor.[91] This study indicates that just one broiler CAFO with fewer than 100,000 birds can cause ambient ammonia levels to exceed chronic and acute health exposure limits, despite variations in wind direction and ventilation practices. As far as the petitioners could determine no published studies to date have measured ambient ammonia concentrations near multiple poultry CAFOs, but multiple CAFOs would increase total ammonia emissions as well as the amount of time that a given residence or public use location would be downwind from emission vents.

The Missouri and Georgia studies both demonstrate that just one CAFO can produce enough ammonia emissions to exceed chronic and acute health thresholds, even without taking the heightened effects of multiple-pollutant exposures into account. Citizens living near one or more large CAFOs require protection from this demonstrated public health threat.

b. The results of EPA's National Air Emissions Monitoring Study show that ammonia emissions may significantly exceed NIOSH and OSHA safety thresholds

[88] *Id*. at 632-33.
[89] *Id*. at 635-37.
[90] *Id*. at 633.
[91] *Id*. at 635.

EPA has recognized the need to study and potentially regulate airborne ammonia from CAFOs, the leading source of U.S. ammonia emissions. From 2007 to 2009 EPA contracted with Purdue University to conduct the National Air Emissions Monitoring Study (NAEMS), which measured emissions of airborne ammonia and other pollutants at 24 CAFO sites in the United States.[92] EPA is currently reviewing the study results to establish emission estimating methodologies for CAFO air emissions.[93] A preliminary assessment of the results from the study, which Purdue presented as a series of 24-hour average values compiled from minute-by-minute monitoring results, shows that most of the monitored CAFOs emit levels of ammonia that exceed OSHA"s PEL and both NIOSH RELs at the emission vent on certain days during the study, and that ammonia emissions fluctuate significantly on a daily and seasonal basis.[94]

The NAEMS study measured ammonia emissions at the vent and at inlet points adjacent to confinement buildings, rather than in the ambient air at a distance from the CAFOs, because the study seeks to establish emissions rates for different types of CAFOs and thereby enable estimates of total CAFO emissions. Due to the nature of the NAEMS data, the petitioners compared these ammonia concentrations with NIOSH and OSHA worker health exposure levels, rather than ATSDR"s or EPA"s exposure recommendations. At-the-vent measures relate most directly to worker health benchmarks, while the ATSDR and EPA health thresholds, intended for the general population, will provide a superior frame of reference for establishing protective NAAQS.

As previously discussed, NIOSH recommends a worker exposure limit of 25 ppm of ammonia averaged over a ten-hour period and 35 ppm averaged over a 15-minute period,[95] while OSHA limits worker exposure to a maximum average ammonia concentration of 50 ppm over an 8-hour time period. Emissions approaching these benchmarks threaten the health and well-being of CAFO workers and also of nearby residents who breathe lower levels of ambient ammonia, but cannot leave the polluted air behind at the end of the work day.

To meaningfully incorporate data measuring emissions at the source into a consideration of whether likely public health threats exist from ammonia in the ambient air, EPA should consider several factors. First, the general public includes populations significantly more sensitive to ammonia than most workers, and thus even if they were protective of worker health, the NIOSH and OSHA standards would not protect public health even for short-term exposures.

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[92] EPA, Air Emissions Monitoring Study, http://www.epa.gov/oecaagct/airmonitoringstudy.html (last visited Mar. 18, 2011); Purdue University, National Air Emissions Monitoring Study Frequently Asked Questions, https://engineering.purdue.edu/~odor/NAEMS/faqs.htm (last visited Mar. 18, 2011). EPA will analyze the results of a Tyson monitoring study in Kentucky as a 25th site when reviewing the NAEMS data. *See* http://www.epa.gov/airquality/agmonitoring/data.html (last visited Mar. 18, 2011).

[93] *See* EPA, Agriculture – Air Monitoring, http://www.epa.gov/airquality/agmonitoring/.

[94] *See* Environmental Integrity Project, *Hazardous Emissions from Factory Farms*, (March 2011), *available at* http://www.environmentalintegrity.org/03_09_2011.php [hereinafter Hazardous Emissions from Factory Farms] (last visited Mar. 18, 2011).

[95] NIOSH, Pocket Guide to Hazardous Chemicals, http://www.cdc.gov/niosh/npg/npgd0028.html.

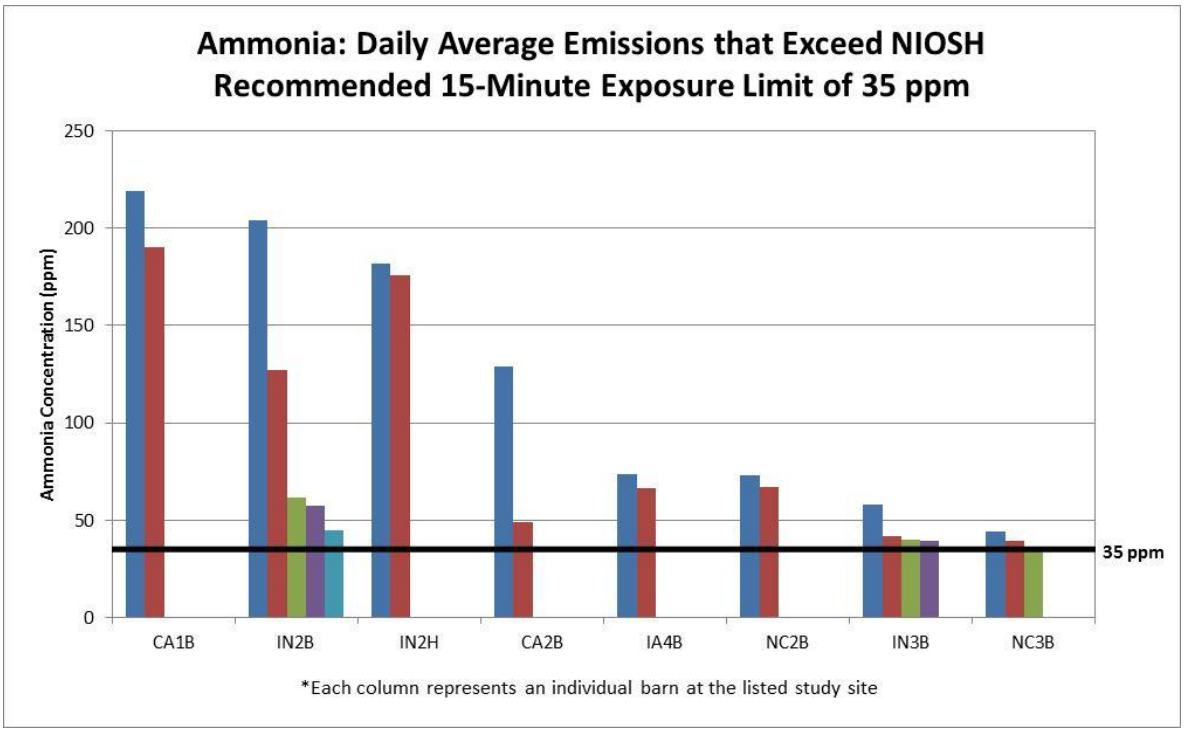
Second, NIOSH and OSHA standards do not consider health effects resulting from continuous intermediate or long-term exposures. Third, the NAEMS data reflect only emissions from a certain part of a CAFO, such as confinement buildings, rather than all emissions sources at or near the site. Finally, many areas contain numerous CAFOs whose emissions mix in the area‟s ambient air, and consequently one cannot make the assumption that ambient ammonia levels will dissipate to safe levels near the source. Whether emissions that exceed NIOSH recommendations or OSHA standards at the vent will also exceed levels that may cause adverse effects – either alone or in combination with other CAFO emissions – and thus may reasonably be anticipated to endanger public health, will vary on a site-to-site basis.

On March 9, 2011, EIP released a report analyzing the data for the 15 confinement sites in NAEMS,[96] which included comparisons of monitoring results with the NIOSH 15-minute REL of 35 ppm. The daily averages can also easily be compared to the 10-hour REL of 25 ppm and the OSHA 8-hour PEL of 50 ppm.[97] Preliminary results from the NAEMS study suggest that CAFO emissions at certain sites commonly exceed both of the NIOSH RELs and even OSHA‟s significantly under-protective 8-hour standard. In fact, 7 of 15 sites had entire days averaging above the OSHA standard, 9 of 15 sites had entire days averaging above the NIOSH 10-hour standard, and as shown below, 8 of 15 sites had entire days averaging above the NIOSH 15-minute standard.[98]

[96] Hazardous Emissions from Factory Farms, supra note 94. The confinement building monitoring sites reviewed in EIP‟s report are CA1B, CA2B, CA5B, IA4B, IN2B, IN2H, IN3B, IN5B, NC2B, NC3B, NC4B, NY5B, OK4B, WA5B, and WI5B.

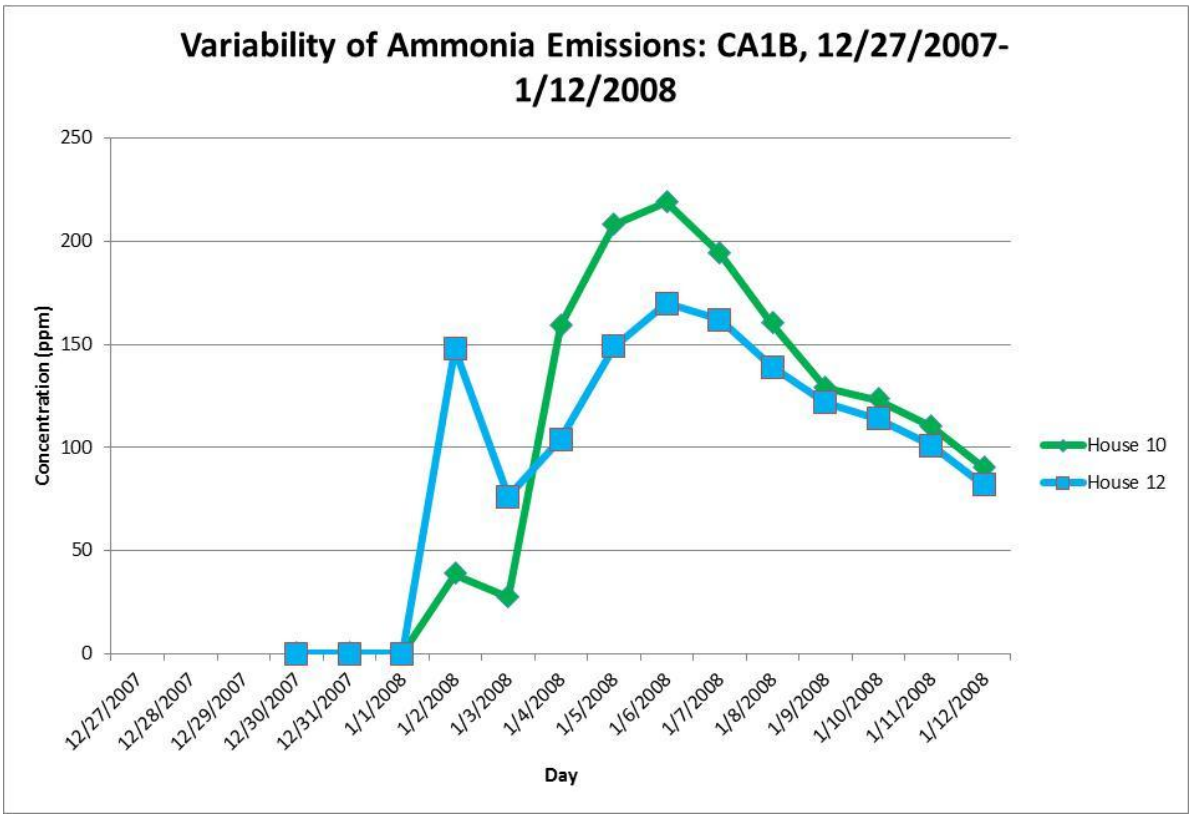
[97] EIP initially sought to compare averages from the monitoring study to the NIOSH RELs and the OSHA PEL by determining the number of 15-minute, 10-hour, and 8-hour exceedances, respectively. However, due to the unavailability of the raw data from the second year of the study, EIP was unable to compile these averages and instead simply identified 24-hour periods during which emissions exceeded the standards. As a result, EIP was also unable to identify very short-term spikes in emissions that may have taken place.

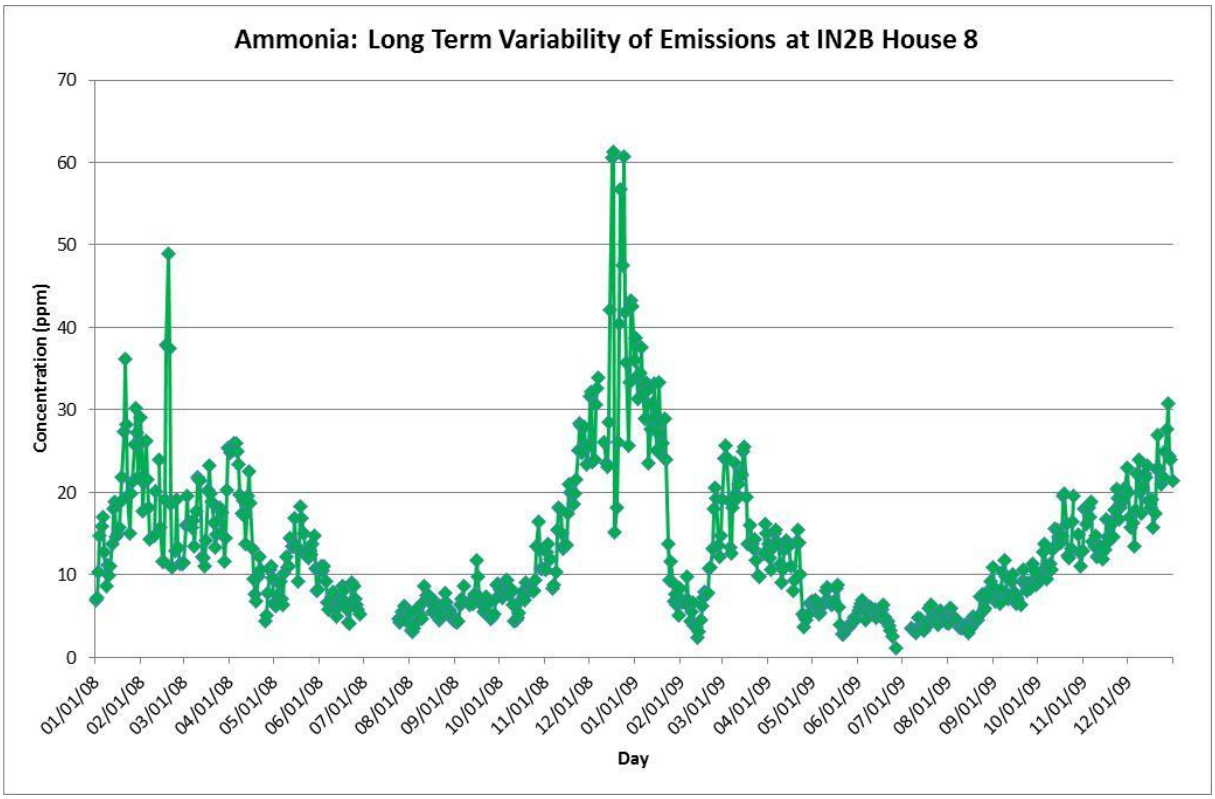
[98] *See* Summary Reports at http://www.epa.gov/airquality/agmonitoring/ and Hazardous Emissions from Factory Farms at 15-16.



In addition to finding numerous exceedances of these time-weighted averages, EIP found that ammonia emissions vary significantly over days and seasons.[99] The following charts, derived from NAEMS data for a California broiler chicken site and an Indiana layer hen site, show both high average concentrations of ammonia on-site and large fluctuations in emissions.[100]

[99] *See* Hazardous Emissions from Factory Farms at 13-15.
[100] *Id*. at 15.


Variability of Ammonia Emissions: CA1B, 12/27/2007-1/12/2008
Concentration (ppm)
250
200
150
100
50
0
12/27/2007
12/28/2007
12/29/2007
12/30/2007
12/31/2007
1/1/2008
1/2/2008
1/3/2008
1/4/2008
1/5/2008
1/6/2008
1/7/2008
1/8/2008
1/9/2008
1/10/2008
1/11/2008
1/12/2008
Day
House 10
House 12


Ammonia: Long Term Variability of Emissions at IN2B House 8
Concentration (ppm)
70
60
50
40
30
20
10
0
01/01/08
02/01/08
03/01/08
04/01/08
05/01/08
06/01/08
07/01/08
08/01/08
09/01/08
10/01/08
11/01/08
12/01/08
01/01/09
02/01/09
03/01/09
04/01/09
05/01/09
06/01/09
07/01/09
08/01/09
09/01/09
10/01/09
11/01/09
12/01/09
Day

This initial assessment suggests that EPA‟s representative CAFOs emit ammonia at levels significantly above worker health benchmarks. The petitioners urge EPA to promptly complete its independent review of Purdue‟s study and the NAEMS data, and establish emission estimating methodologies that will enable EPA to accurately inventory CAFO ammonia emissions nationwide.

Although these at-the-vent measures cannot be directly translated into ambient ammonia levels, the NAEMS study‟s findings still bear on EPA‟s consideration of ammonia‟s public health impacts. As this petition discusses in the following section, because many regions and communities contain high concentrations of CAFO facilities, EPA cannot assume that at-the-vent measures do not affect ambient ammonia levels. Moreover, because the NAEMS data show that CAFO ammonia emissions are not stable in quantity and rate, but rather spike to high levels for short durations and vary significantly throughout the year, EPA cannot discount at-the-vent measures under the assumption that all emissions will dissipate to safe levels before impacting nearby residents. EPA should consider the NAEMS data when assessing the public health threat of ambient ammonia from CAFOs.

c. Ammonia in CAFO emissions contributes to documented adverse health impacts on nearby residents

Studies of public health in communities near CAFOs indicate that air emissions from these operations, including ammonia emissions, adversely affect respiratory health of residents breathing ambient air near CAFOs. Although these studies examine the health effect of combined air pollutants from livestock operations, rather than attempting to isolate the effects of ammonia emissions, the CAA requires EPA to list as criteria pollutants those pollutants that "*contribute to* air pollution which may reasonably be anticipated to endanger public health" (emphasis added) § 108(a)(1)(A). Ammonia is a known toxin and respiratory irritant emitted by CAFOs in vast quantities, and therefore clearly "contributes to" the air pollution causing known health impacts near these facilities.

The 2002 Iowa Study reviewed research on both occupational and community exposures to CAFO air emissions and their documented health impacts. Though occupational exposures have been more extensively researched, the Study authors found "experimental and epidemiological evidence that very low levels of exposures to ammonia…may result in adverse health effects among healthy volunteers and community residents."[101] Despite the relatively small number of peer-reviewed studies of community health impacts that existed at the time, the Iowa Study concluded that the research base was sufficient to "support a conclusion that CAFO air emissions constitute a public health hazard."[102]

[101] Iowa Study at 138.
[102] *Id*.

One sociological study considered by the Iowa Study authors involved a survey of 18 Iowa residents who lived within 2 miles from a 4,000 head sow confinement operation.[103] The study compared self-reported answers from the hog CAFO neighbors with those of a control group that did not live near significant livestock production,[104] and separated health impacts into four categories of symptoms commonly experienced by CAFO workers: 1) cough, sputum, shortness of breath, chest tightness, and wheezing; 2) dizziness, weakness, fainting, and nausea; 3) plugged ears and headaches; 4) scratchy throat, runny nose, and burning eyes.[105] The study found an increase in all four groups of symptoms among residents in the hog CAFO community.[106]

Another study considered both health effects and quality of life impacts of living near CAFOs. Researchers interviewed 155 residents from three North Carolina communities: one near two industrial cattle facilities, one near a 6,000 head hog CAFO, and one without any CAFOs nearby.[107] The study asked questions about rural health, rather than the livestock operations, to avoid bias. Residents near the hog CAFO reported higher rates of several respiratory and other symptoms compared to the control group, including headaches, coughing, sore throat, burning eyes, diarrhea, and runny nose.[108]

New research further supports the Iowa Study's findings. In March 2011, Schinasi, et al. published an epidemiological study correlating air pollution from hog CAFOs in North Carolina with self-reported health effects among community residents.[109] The study examined associations between monitored air pollutants and physical symptoms among 16 communities living within 1.5 miles of hog operations.[110] Although monitored pollutants did not include ammonia, participants also reported overall odor levels. The researchers found that "[i]rritation symptoms were elevated in association with odor"[111] and concluded that "pollutants near hog operations cause acute physical symptoms, particularly upper respiratory symptoms and irritation of the nose and eyes."[112]

The Pew Commission report also reviewed research on the public health effects of CAFOs, and similarly found that living in close proximity to CAFOs has documented adverse health effects. In particular, studies have shown respiratory health impacts from CAFO air

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[103] Thu et al., *A Control Study of the Physical and Mental Health of Residents Living Near a Large-Scale Swine Operation*, 3 J. of Agric. Safety and Health (1997).
[104] *Id*.
[105] *Id*.
[106] *Id*. Cluster 4 showed a slight prevalence in the hog community (with the exception of the "other" symptoms in cluster 4, which did not show a difference between the two communities studied).
[107] Steve Wing and Susanne Wolf, *Intensive Livestock Operations, Health and Quality of Life Among Eastern North Carolina Residents*, 108 Envt'l Health Perspectives (March 2000).
[108] *Id*. at 237.
[109] Schinasi, et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 Epidemiology 2 (March 2011) [hereinafter Schinasi].
[110] *Id*. at 1.
[111] *Id*. at 5.
[112] *Id*. at 7.

emissions; primary respiratory effects included increased incidence of asthma among both children and adults. The Commission identified four "large epidemiological studies" that found "strong and consistent" links between CAFO pollution and asthma,[113] concluding that communities near CAFOs "are subject to air emissions that, although lower in concentration [than worker exposures], may significantly affect certain segments of the population."[114]

A 2005 study simulated the health effects of short-term exposure to hog CAFO emissions, by diluting hog CAFO air and exposing 24 healthy adults (12 male, 12 female) for one hour at a time on two separate occasions.[115] The researchers exposed a control group of 24 healthy adults to clean air for the same time period. The study measured objective health indicators, such as blood pressure, and participants also self-reported symptoms such as headaches and nausea and completed a Profile of Mood States survey.[116] The diluted hog confinement air had an ammonia concentration of 817 ppb (0.817 ppm)[117] – well below levels observed in the ambient air near some CAFOs, yet several times the 150 ppb one-hour standard recommended in the Iowa Study. After just an hour of exposure, those exposed to the hog confinement air were four times as likely to report headaches, six times more likely to report eye irritation, and nearly eight times as likely to report nausea than the control group.[118]

Another recent study compared nation-wide, county-level data on infant mortality rates and causes with geographic shifts in the livestock industry over two decades, in order to assess the impacts of living in proximity to livestock on infant mortality and the probable mechanisms for any impact observed.[119] After controlling for numerous variables and potential sources of bias, the author found that "a 100,000 animal unit increase [at the county level] corresponds to 123 more infant deaths per 100,000 births," with about 80% of these occurring during first 28 days of life.[120] Given the robustness of the data set, this demonstrates a "statistically significant correlation between livestock and infant death."[121] Of these mortalities, only respiratory and perinatal causes of death were affected, "suggesting an air pollution mechanism."[122] Of the many constituents of livestock air emissions, the study cites ammonia and hydrogen sulfide as

[113] Pew Commission Report at 17.
[114] *Id*.
[115] Susan S. Schiffman et al., *Symptomatic Effects of Exposure to Diluted Air Sampled from a Swine Confinement Atmosphere on Healthy Human Subjects*, 113 Envt'l Health Perspectives 5 (May 2005).
[116] *Id*. at 568-70.
[117] *Id*. at 568.
[118] *Id*. at 573.
[119] S. Sneeringer, *Does Animal Feeding Operation Pollution Hurt Public Health? A National Longitudinal Study of Health Externalities Identified by Geographic Shifts in Livestock Production*, 91 Amer. J. of Agric. Econ. 1 (Feb. 2009).
[120] *Id*. at 129.
[121] *Id*.
[122] *Id*. at 125.

the "main gases in question," because both have been linked to respiratory infections and distress in infants, perinatal disorders, and spontaneous abortion.[123]

d. CAFOs emit vast quantities of ammonia and are often concentrated geographically

i. CAFOs emit vast quantities of ammonia

EPA should regulate ambient ammonia because estimated CAFO ammonia emission rates indicate that these facilities release vast quantities of ammonia into the ambient air, creating a heightened health threat to communities near numerous and/or very large CAFOs. CAFOs are leading contributors to the nation"s ammonia inventory; by one EPA estimate livestock account for approximately 80 percent of total emissions.[124] CAFOs also emit a disproportionately large share of the ammonia in certain states and communities. One striking example is Threemile Canyon dairy farm near Boardman, Oregon, which reported ammonia emissions as high as 15,500 pounds per day in 2005 – more than the nation"s number one manufacturing source of the pollutant.[125] Two studies – the Tyson Broiler Report and the Purdue NAEMS Layer Site study – measured the emission rates of ammonia released from broiler houses and layer barns, respectively. EIP used these emission rates to roughly estimate poultry CAFO ammonia emissions on a much broader scale, and found that poultry CAFOs in several states release an overwhelming majority of those states" ammonia emissions.

In May 2007, Iowa State University and the University of Kentucky released the "Tyson Broiler Ammonia Emission Monitoring Project: Final Report."[126] The report, which Tyson agreed to participate in pursuant to a settlement with the Sierra Club,[127] summarized a study in which university researchers measured ammonia emissions from two broiler houses in Western Kentucky with Mobile Air Emissions Monitoring Units (MAEMUs) attached to each house.[128] Each house had a series of six flocks of broiler chickens, with growing periods of just over 50 days each and several days in between flocks, during the approximately 13-month continuous study.

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[123] *Id*. at 126.
[124] MICHIEL R.J. DOORN ET AL., EPA, REVIEW OF EMISSIONS FACTORS AND METHODOLOGIES TO ESTIMATE AMMONIA EMISSIONS FROM ANIMAL WASTE HANDLING 1 (2002), *available at* http://www.epa.gov/nrmrl/pubs/600r02017/600sr02017.pdf (last visited Mar. 18, 2011).
[125] Michele M. Merkel, Senior Counsel, Envtl. Integrity Project, N.Y. State Bar Association presentation at Albany Law School: The Use of CERCLA to Address Agricultural Pollution, at 1 (Sept. 15, 2006), *available at* http://www.environmentalintegrity.org/pdf/publications/The_Use_Cercla.pdf (last visited Mar. 18, 2011).
[126] Iowa State University and the University of Kentucky, *Tyson Broiler Ammonia Emission Monitoring Project: Final Report*, p. 1-34 (May 1 2007) [hereinafter Tyson Broiler Report].
[127] *See* Sierra Club, *Grassroots Stories*, http://www.sierraclub.org/grassroots/stories/00027.asp (last visited Mar. 18, 2011).
[128] Tyson Broiler Report at 2.

The MAEMUs measured ammonia concentration every 30 seconds from three locations inside of the houses and every two hours at one location just outside of the houses.[129] The researchers converted the raw ammonia concentration data into emission rates, in pounds of ammonia per day per house (lb/d-house).[130] This resulted in a 12-flock mean emission rate of 30.8 +/- 20.0 lb/d-house.

A 2007 Purdue study conducted as part of EPA's NAEMS study, discussed above in section (b), shows that laying hen operations also emit vast quantities of ammonia. Purdue released a site report for an Indiana NAEMS site, which measured ammonia concentrations and emissions rates inside two barns (Barns 6 and 7) housing laying hens. The report analyzed monitoring results collected between May 12 and June 30, 2007.[131] The monitors recorded the concentration of ammonia in ppm, and then converted those data into emission rates. The researchers calculated average daily mean ammonia emission rates of 252 +/- 99 and 308 +/- 63 kg/day for barns 6 and 7 respectively.[132]

In December of 2009, EIP finalized a report entitled "A Holiday Gift for Big Poultry: Bush Administration Rushes Emissions Reporting Exemption," which extrapolates from these two studies' emission rates.[133] Using the number of broiler chickens and egg laying hens per state,[134] EIP calculated an estimate of the total pounds of ammonia released by the top ten poultry producing states in 2007 and the total pounds of ammonia released in the top ten states for each type of poultry CAFO.

EIP's report found that, according to these studies' emission factors, poultry operations in just the top ten states released an estimated 700 million tons of ammonia into the air in 2007. These 10 states emit more ammonia from poultry facilities than all other non-agricultural

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[129] *Id*. at 8.

[130] *Id*. at 1. The results varied significantly between the two houses, primarily due to different manure handling methods: one house received new rice hull bedding and had litter removed mid-way through the study, while the other had the same bedding and no litter de-caking during the study. The house that received new litter after several flocks had significantly lower emissions while the houses had birds in them, but significantly higher average emissions during the downtime between flocks, possibly due to the de-caking activity releasing ammonia. *Id*. at 21. These results underscore the importance of considering waste management practices, emissions from litter stockpiles, and emissions from land application of waste, when evaluating the public health impacts of CAFO ammonia emissions. Thus, even the ammonia emissions estimates in EIP's study, summarized below, do not include all emissions from litter removed from poultry houses.

[131] Purdue University, *National Air Emissions Monitoring Study Data from Layer Site IN2H, May 12 to June 30 2007* at 1, 10, Figure 4 [hereinafter Purdue Study].

[132] Purdue Study at 15.

[133] Environmental Integrity Project, *A Holiday Gift for Big Poultry: Bush Administration Rushes Emissions Reporting Exemption*, (Corrected December 2009), *available at* http://environmentalintegrity.org/news_reports/Bush_administration.php. [Hereinafter EIP Report] (last visited Mar. 18, 2011).

[134] As provided by the U.S. Department of Agriculture's *Poultry-Production and Value 2007 Summary*, released April 2008, and the U.S. Department of Agriculture's *Chicken and Eggs*, released November 21, 2008.

industries in the entire U.S. emit combined.[135] Looking at the two types of poultry production individually, broiler chicken operations in the top ten states[136] emitted an estimated 481,764,049 pounds of ammonia in 2007, which is greater than eight times the amount of ammonia emissions reported to the Toxic Release Inventory (TRI) by all industrial sources in those ten states combined.[137] Egg laying operations in the top ten states[138] emitted an estimated 221,551,888 pounds of ammonia per year.[139] These emissions approximately triple the amount that all industrial sources in those states combined reported to the TRI.[140]

As indicated above, industrial sources must report their ammonia emissions to the TRI under the Emergency Planning and Community Right-to-Know Act (EPCRA).[141] The TRI program does not require CAFOs to report emissions, however, even though they emit the dominant share of total ammonia emissions. Consequently, the TRI ammonia totals reported by industries in the top ten states for broilers and egg laying operations bear little relation to the total volume of ammonia released into the air in these states. For instance Georgia, the nation"s number one producer of broiler chickens, emitted an estimated 97,618,755 pounds of ammonia from CAFOs in 2007, yet the state"s industrial sources combined reported only 11,936,373 pounds of ammonia to the TRI.[142] Similarly Iowa, the nation"s number one producer of eggs, emitted an estimated 53,012,347 pounds of ammonia into the air from its layer hen CAFOs, while the state"s industrial sources reported only 9,425,300 pounds to the TRI.[143]

Hog CAFOs also emit large quantities of ammonia. The Iowa Study researchers evaluated several peer-reviewed studies of hog CAFO ammonia emissions, establishing a range of emission factors for various stages of hog maturity, including nursery pigs and finishing pigs.[144] These studies indicate that many factors, such as ventilation system, animal maturity, waste storage system, season, and outside temperature significantly affect ammonia emission rates.[145] The highest measured emission rate for a hog nursery included in the Iowa Study, 160 g ammonia per animal unit per day,[146] translates to a daily emission of 353 pounds of ammonia for a facility at the Large CAFO threshold size.[147] The highest reported emissions from a hog finishing facility, 311 g ammonia per animal unit per day during summer,[148] translates to a daily

[135] EIP Report at 1.
[136] Georgia, Arkansas, Alabama, Mississippi, North Carolina, Texas, Kentucky, Maryland, Virginia, and Delaware.
[137] EIP Report Attachment A.
[138] Iowa, Ohio, Indiana, Pennsylvania, Georgia, Texas, California, Arkansas, North Carolina, and Florida.
[139] EIP Report Attachment A.
[140] *Id*.
[141] *See* EPA, What is the Toxics Release Inventory Program, at http://www.epa.gov/TRI/triprogram/whatis.htm (last visited Mar. 18, 2011).
[142] EIP Report, Attachment A.
[143] *Id*.
[144] Iowa Study at 48-49.
[145] *Id*.
[146] *Id*. at 49.
[147] 40 C.F.R. §122.23(b)(4).
[148] Iowa Study at 49.

emission of 686 pounds of ammonia for a facility at the Large CAFO threshold size. These studies demonstrate that, particularly during summer, hog CAFOs emit vast quantities of ammonia. Though Iowa leads the nation in hog production, it is not the only state of concern. According to the North Carolina Department of Environment and Natural Resources‟ 1995 estimates, North Carolina sources released an enormous 355 million pounds of ammonia into the air that year, of which hog operations alone released 166 million pounds.[149]

EIP‟s analysis of EPA‟s NAEMS data also indicates that most CAFOs monitored emit more than the reportable quantity – 100 pounds – of ammonia on a typical day, and some facilities studied emit thousands of pounds on a typical day.[150] As discussed previously, ammonia emissions also vary significantly over both the short and long term, such that large CAFOs can emit many thousands of pounds of ammonia on certain days. Although NAEMS did not measure ambient ammonia levels in communities near these operations, the sheer volume of total ammonia emissions from CAFOs – particularly poultry CAFOs – creates cause for concern that those living or working near numerous or very large CAFOs may breathe unsafe levels of ammonia in the ambient air.

CAFOs emit the majority of ammonia emissions but remain largely unaccountable for their air pollution. Despite the gap in emissions knowledge EPA‟s limited TRI reporting system and livestock exemption from CERCLA reporting have created, available emissions research and EIP‟s analysis of the Tyson and Purdue studies demonstrate the need to regulate CAFO ammonia emissions commensurate with their controlling contribution to total ammonia pollution. EPA should consider these studies‟ findings as to the enormous quantities of ammonia CAFOs currently emit in certain regions when deciding whether to list ammonia as a criteria pollutant.

ii. CAFOs are geographically concentrated

This vast quantity of airborne ammonia emitted by CAFOs does not exist at equal concentrations throughout the U.S. or throughout certain agricultural states; rather, CAFOs and the ammonia they release are concentrated in certain geographic regions, creating areas with an elevated risk of ammonia-related health effects for nearby rural populations. Many rural communities breathe the emissions from not just one or two CAFO barns, but from many CAFOs, each of which contains numerous barns.

Concentration of CAFOs in certain geographic areas has increased dramatically in recent years, and exists on a far more localized scale than the state-level concentration demonstrated in EIP‟s poultry emissions report. The Government Accountability Office (GAO) discussed this trend in its 2008 report “Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of

[149] North Carolina Department of Environment and Natural Resources Division of Air Quality, *Status Report on Emissions and Deposition of Atmospheric Nitrogen Compounds from Animal Production in North Carolina*, Table 1 (June 1999), *available at* http://daq.state.nc.us/monitor/projects/nstatusreport.pdf (last visited Mar. 18, 2011).
[150] Hazardous Emissions from Factory Farms at 12-13.

Concern."[151] In its report, GAO concludes that CAFOs are "increasingly clustered within specific geographic areas within a state,"[152] and cites several alarming examples of communities besieged by CAFOs housing many millions of confined animals in small areas.

One such area, comprised of five contiguous counties in North Carolina, alone housed more than 7.5 million hogs and produced as much as 15.5 million tons of manure in 2002.[153] This increased concentration is not limited to the hog industry. GAO also highlights two California counties in the San Joaquin Valley that contained 535,433 cows in 2002, producing approximately 13.6 million tons of manure that year.[154] Similarly, in Arkansas just two counties had amassed broiler chicken CAFOs housing 14,264,828 chickens in 2002, producing more than 471,000 tons of manure that year.[155]

Yet another example of intense livestock concentration is the Delmarva Peninsula, where contract producers raise approximately 568 million broiler chickens per year, generating an estimated 1.1 billion pounds of chicken litter.[156] This averages more than a staggering 104,000 chickens per square mile on the 5,450 square mile peninsula. Experts have raised concerns that such incredible quantities of waste cannot be applied to the surrounding area"s available cropland at agronomic rates;[157] for similar reasons, the emissions from these quantities of manure and numbers of livestock confinements should raise concerns that ambient concentrations of ammonia and other emitted pollutants will exceed safe levels.

Rural residents throughout the U.S. live in close proximity to CAFO production areas and manure application fields – some in areas that contain numerous CAFOs in close proximity to one another, whose ammonia emissions mix in the ambient air and cause significant local re-deposition.[158] EPA should consider the aggregate effects of ammonia emissions on ambient air concentrations in these rural communities and the commensurately higher impact emissions have on public health in these areas with high concentrations of CAFOs.

The growing body of CAFO ammonia emissions research, which includes monitoring both at the source and at nearby residences, collectively compels the conclusion that ambient ammonia air pollution currently surpasses established health benchmarks and thus may reasonably be anticipated to endanger public health. To designate ammonia as a CAA criteria

[151] GAO, *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* (Sept. 2008) [hereinafter GAO Report].
[152] GAO Report at 5.
[153] *Id* at 21.
[154] *Id*. at 22.
[155] *Id*.
[156] Karen Gardner, *Farmer: Chesapeake Bay cleanup requires unity*, FREDERICK NEWS POST, Dec. 3, 2010, *available at* http://www.fredericknewspost.com/sections/news/display.htm?storyid=113253 (last visited Mar. 18, 2011).
[157] GAO Report at 22.
[158] *See* discussion of ammonia transport and fate, *infra* Section V.B.2.ii.

pollutant, EPA does not need to find that all Americans currently breathe unsafe levels of ammonia, or even that residents near CAFOs and other ammonia sources are suffering life-threatening or permanent health effects. On the contrary, the CAA gives EPA significant discretion to enact health protections even if it lacks absolute scientific certainty about the nature or extent of the threat and even if the entire population is not affected.[159]

e. Ammonia is a significant precursor to $PM_{2.5}$, and endangers public health by contributing to violations of the fine particulate NAAQS

The CAA requires EPA to consider criteria pollutant precursors as well as criteria pollutants themselves, by defining "air pollutant" to include "any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term "air pollutant" is used." CAA § 302(g). EPA has identified ammonia as a precursor pollutant to small particulate matter ($PM_{2.5}$), but does not currently require states to regulate ammonia as a precursor pollutant "unless the State or EPA makes a technical demonstration that emissions of ammonia from sources in the State significantly contribute to $PM_{2.5}$ concentrations in a given nonattainment area."[160]

Although some airborne ammonia will re-deposit close to the emission source, ammonia gas reacts readily with acidic compounds in the air, such as nitric acid, hydrochloric acid, and sulfuric acid, forming small particles known as ammonium aerosols."[161] These particles of ammonium nitrate and ammonium sulfate have diameters smaller than 2.5 microns, and thus qualify as $PM_{2.5}$ – a regulated CAA criteria pollutant. EPA has recognized the health impacts of particulate pollution, and $PM_{2.5}$ in particular, for decades, so this petition will not address them in detail. EPA"s current NAAQS for $PM_{2.5}$ are meant to protect the public health and welfare from the respiratory symptoms, decreased lung function, aggravated asthma symptoms, chronic bronchitis, irregular heartbeat, heart attacks, and premature death associated with small particle pollution.[162] These NAAQS do not require ammonia regulation, however, despite recent research indicating that ammonia contributes significantly to $PM_{2.5}$.

One recent study clarifies the role ammonia plays in $PM_{2.5}$ formation and seasonal $PM_{2.5}$ variations.[163] Researchers used the Community Multiscale Air Quality chemical transport model[164] to predict the environmental impact of ammonia emissions in $PM_{2.5}$ non-attainment

[159] *See* discussion of EPA"s Sulfur Dioxide Rule, *infra* Section VI.
[160] Rich Damberg, EPA Office of Air Quality Planning and Standards, *Policies for Addressing PM2.5 Precursor Emissions* (June 20, 2007) at Slide 8.
[161] Aneja at 516.
[162] EPA, Particulate Matter: Health and Environment, http://www.epa.gov/pm/health.html (last visited Mar. 18, 2011).
[163] R. W. Pinder et al., *Environmental Impact of Atmospheric NH_3 Emissions Under Present and Future Conditions in the Eastern United States*, 35 Geophysical Res. Letters (June 2008) at 2 [hereinafter Pinder].
[164] *See* EPA, Atmospheric Modeling and Analysis Division, Community Multiscale Air Quality (CMAQ), http://www.epa.gov/AMD/CMAQ/ (last visited Mar. 18, 2011).

areas, considering future scenarios in which EPA's recently amended regulations have reduced emissions of oxides of nitrogen (NO_x) and sulfur oxides (SO_x). The authors explain that although ammonia can react with either NO_x or SO_2 to form small particulates, in the absence of ammonia NO_x will stay in gaseous form, while SO_2 can readily react with other compounds to form other small particles. Because in winter a higher proportion of $PM_{2.5}$ is ammonium nitrate (formed from ammonia and NO_x) than in summer, the "sensitivity of $PM_{2.5}$ to ammonia emissions reductions" is greatest in winter[165] and thus reductions in winter ammonia emissions may significantly reduce $PM_{2.5}$. This conclusion supports findings in previous studies that under certain circumstances winter ammonia emissions reductions can be an even "more effective and less costly control strategy for $PM_{2.5}$ than reductions in NO_x and SO_2."[166] The modeling further suggests that "NH_3 emission controls will continue to be an effective strategy to achieve further reductions in winter $PM_{2.5}$, even considering the planned reductions in NO_x and SO_2 emissions."[167]

Other studies have estimated ammonia's contribution to $PM_{2.5}$ and the contribution of ammonia from livestock in particular. One study looked at the constituents and sources of $PM_{2.5}$ in the eastern U.S., concluding that "ammonia comprises a significant portion of the $PM_{2.5}$ mass" in the region – 47 percent.[168] Penn State researchers have looked specifically at livestock's contribution to ammonium nitrate formation. Using the conservative estimate that livestock contribute only 51 percent of total ammonia emissions, the study found that livestock ammonia emissions lead to the formation of 9 to 11 percent of total U.S. $PM_{2.5}$, while in winter in the Upper Midwest this contribution may be as high as 20 percent.[169] EPA's failure to consider ammonia's localized and seasonal effects on $PM_{2.5}$ concentrations, and to require state regulation of ammonia sources in $PM_{2.5}$ non-attainment areas, contravenes current research.

The evidence provided in this petition demonstrates that ammonia clearly meets the CAA criteria pollutant standard: ammonia emissions cause or contribute to air pollution – both ammonia itself and $PM_{2.5}$ – that may reasonably be anticipated to endanger public health. EPA should make an endangerment finding, designate ammonia as a criteria pollutant, and establish primary NAAQS that will protect public health with an adequate margin of safety.

2. Ammonia emissions endanger public welfare

CAA § 109(b)(2) requires EPA to establish secondary NAAQS for criteria pollutants, set at levels that protect the public welfare "from any known or anticipated adverse effects

[165] Pinder et al. at 2.
[166] *Id*. at 1.
[167] *Id*. at 4.
[168] Natalie Anderson et al., *Airborne Reduced Nitrogen: Ammonia Emissions from Agriculture and Other Sources*, 29 Env't Int'l (2003) at 277.
[169] Alexander N. Hristov, Associate Professor of Dairy Nutrition, Penn State Department of Dairy and Animal Science, *Livestock Contribution to Fine Particulate Matter (PM2.5) in the U.S.*, 16 February 2009, *available at* http://www.das.psu.edu (search "particulate matter") (last visited Mar. 18, 2011).

associated with [the criteria pollutant] in the ambient air." Public welfare has many dimensions, which include environmental and economic impacts as well as psychological health and quality of life.

CAA §302(h) defines "welfare" broadly and non-exclusively:

> "[a]ll language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants."

This open-ended definition demonstrates Congress' understanding that air pollution has numerous and complex adverse effects, and its intent that EPA should exercise its broad regulatory authority to mitigate any and all of them. This section will provide evidence of the public welfare impacts of ammonia emissions, alone and in combination with other CAFO emissions, on personal comfort and well-being, water and soil quality, property values, and visibility.

i. Ammonia emissions threaten personal comfort and well-being

Airborne ammonia most obviously impacts a person's personal comfort and well-being through odor. Airborne ammonia has a pungent, unpleasant smell often associated with urine. Indeed, many complaints from communities that live close to CAFOs concern the effects of the odor emanating from the CAFOs on their daily lives.[170] These nuisance effects of ammonia odor on important aspects of public welfare exist independent of the public health effects from more elevated ambient concentrations. The odor released from CAFOs typically includes a mixture of hydrogen sulfide (H_2S), volatile organic compounds (VOCs), ammonia, and other gases.[171] However, although airborne ammonia is only one component of the cumulative odor emitted from CAFOs, they release it in vast quantities.

Moreover, though many pollutants from CAFO emissions combine to cause the nuisance odors that impact several aspects of public welfare, this does not lessen EPA's obligation to address ammonia's public welfare impacts. Congress anticipated this scenario when drafting the CAA, and specifically included effects "caused by…combination with other air pollutants" in its definition of welfare. CAA § 302(h). Ammonia is a primary pollutant in CAFO air emissions, emitted in large quantities from CAFOs housing all types of livestock, and EPA should act to

[170] *See, e.g.,* Iowa Study at 71.
[171] EPA, Animal Feeding Operations Air Agreements, http://www.epa.gov/compliance/resources/agreements/caa/cafo-agr.html (last visited Mar. 18, 2011). *See also* Schiffman, et al., *Quantification of odors and odorants from swine operations in North Carolina*, 108 Agric. and Forest Meteorology (2001).

mitigate the community well-being and public welfare impacts of ammonia in combination with other CAFO air pollution.

The 2008 Pew Commission Report surveyed research on the social and community impacts of CAFO emissions. The Commission concluded that residents near CAFOs "are subject to air emissions that, although lower in concentration [than worker exposures], may significantly affect certain segments of the population."[172] After reviewing existing research, the Commission identified community physical and mental health effects such as respiratory symptoms and neurobehavioral effects such as depression.[173] The Commission also considered the effect of CAFO odor compounds on mood, and determined that due to the toxicity and odor of ammonia and other CAFO emissions it is "not surprising" that existing studies have shown "increased rates of neurobehavioral symptoms such as depression."[174]

The North Carolina study previously discussed evaluated quality of life factors in addition to health symptoms.[175] The study evaluated quality of life indicators by calculating the number of days that the community members had to stay inside or keep windows closed during good weather. Because those living near the hog CAFO had to stay indoors significantly more often than the other groups, the study concluded that proximity to the hog CAFO reduced this community's quality of life.[176]

Another North Carolina study used a "Profile of Mood States" test to compare the psychological state of 44 community members living close to a large swine confinement to the psychological state of community members who did not live close to the swine confinement.[177] The study showed that members living close to the swine confinement experienced more anger, tension, and depression than the control group; they also suffered physical effects, experiencing more fatigue and confusion than the control group.[178]

The Iowa Study also reviewed numerous polls and surveys of the nuisance effects of livestock operations, including odors and air pollution. The Study found that rural residents find livestock odors a major nuisance, and that odors, rather than traffic, noise, dust, flies, or other problems, create the significant majority of the nuisance issues arising from CAFOs in close proximity. Moreover, those surveyed reported that larger farms were a greater nuisance than smaller ones.[179]

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[172] Pew Commission Report at 17.
[173] *Id*.
[174] *Id*.
[175] Steve Wing and Susanne Wolf, *supra* note 107.
[176] *Id*. at 236; Iowa Study at 150.
[177] Iowa Study at 137, *citing* Schiffman et al., *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*, 17 Brain Res. Bulletin (1995).
[178] *Id*.
[179] Iowa Study at 149-50.

These studies detail some of the difficult-to-quantify effects of CAFO ammonia emissions on personal comfort and well-being. Emotions such as depression, anger, and fatigue play a central role in personal well-being, and therefore in public welfare. Similarly, the degree to which rural residents may open their windows, go outside, and otherwise enjoy their property directly affects both comfort and well-being. When rural citizens lack these basic rights and comforts – things most Americans take for granted – the public welfare suffers. The authors of the Iowa Study drew a similar conclusion, reporting that CAFO neighbors often hesitate to make social plans at their houses because they have no control over what the air quality will be like on a certain day, and as a result, CAFOs reduce social capital.[180]

The Iowa Study and Pew Commission Report also found correlations between increased size and industrialization of livestock operations and overall social and economic decline. One such study noted by both the Iowa and Pew reports contrasted family farm and industrial agricultural areas in 98 counties across several states, concluding that farm size and mechanization "significantly predict declining community conditions not merely at the local agricultural community level, but in the entire county."[181] The Iowa Study's review of Midwest CAFO research also found "tendencies of economic decline in communities with greater concentration of CAFOs."[182] While these studies do not attempt to discern the share of these impacts attributable directly to ammonia and other air emissions, these emissions cause demonstrated adverse welfare impacts and clearly contribute to the observed trends of social decline. Because numerous peer-reviewed studies demonstrate that ammonia emissions from CAFOs decrease personal comfort as well as social and economic well-being, ammonia meets the CAA definition of a pollutant which can reasonably be anticipated to endanger public welfare.

ii. Ammonia emissions re-deposit, polluting waterways and acidifying soils

The CAA definition of welfare impacts specifically includes impacts to water, vegetation, and soil. CAA § 302(h). Ammonia emissions have far-reaching environmental impacts, and affect public welfare by polluting water and land as well as air. While transport distances vary based on numerous environmental and climate factors, airborne ammonia eventually leaves the atmosphere, either as ammonia or after conversion to ammonium aerosol particles, through the processes of either dry or wet deposition.[183] Dry deposition occurs when the ammonia falls to earth without the presence of precipitation, while wet deposition occurs when ammonia returns

[180] *Id*. at 150.
[181] *Id*. at 148, *quoting* MacCannell D. Industrial agriculture and rural community degradation. In Swanson LE, ed. Agriculture and community change in the U.S.: The Congressional research reports at 63 (pp. 15-75). Boulder, CO: Westview Press (1988). *See also* Pew Commission Report at 42-43.
[182] Iowa Study at 148.
[183] U.S. Department of the Interior, U.S. Geological Survey (USGS), *Atmospheric Deposition Program of the U.S. Geological Survey: Fact Sheet FS-112-00 p. 1-6*, (December 2000) at 1, *available at* http://bqs.usgs.gov/AcidRain/program.pdf [hereinafter USGS Fact Sheet] (last visited Mar. 18, 2011).

to the earth via rain, snow, sleet, or fog.[184] This deposition can add nitrogen directly to waterways, or can add nitrogen to land areas, acidifying soils and ultimately adding to water pollution through surface runoff.

Ammonia gas emissions have a typical transport time ranging from one to five days.[185] Because "[p]recipitation readily removes most reactive nitrogen compounds, such as ammonia and nitrogen oxides, from the atmosphere,"[186] a significant percentage of volatilized ammonia can re-deposit within these first few days. Ammonia that converts to ammonium aerosol particles rather than depositing directly has a much longer average transport time, ranging from one to fifteen days.[187] As a result, the rate of conversion from ammonia gas to ammonium aerosol particles will significantly affect deposition patterns, as ammonium aerosols may travel thousands of kilometers before re-depositing.[188]

Additional factors also affect ammonia conversion, transport and deposition – including the prevalence of NO_x and SO_2 in the atmosphere, temperature, and precipitation patterns – making models and predictions of ammonia deposition impacts extremely complex.[189] However, existing research demonstrates that ammonia emissions, particularly in areas with high concentrations of CAFOs, can have severe local and regional effects on water quality. Watersheds in regions with numerous sources of ammonia emissions, such as the Chesapeake Bay, North Carolina, and the Mississippi River Corridor, receive high levels of overall nitrogen and ammonium deposition.[190]

When ammonia re-deposits into surface water, it endangers public welfare by polluting the water with excess nitrogen. The eutrophication process occurs when excess nutrients, in this case nitrogen in ammonia, enter surface water, thereby upsetting the nutrient balance of the waterway and contributing to increased algal growth.[191] Due to the nutrient overload in the water, algae initially flourish, but as these algae die off, the decomposition process depletes the water of its oxygen content.[192] Extreme cases of eutrophication lead to hypoxic "dead zones," such as the more than 15,000 square kilometer area in the Gulf of Mexico devoid of aquatic life.[193] Due in large part to increased nutrient loads from changed agricultural practices in the

[184] USGS Fact Sheet at 1.
[185] Viney P. Aneja et al., *Ammonia Assessment from Agriculture: U.S. Status and Needs*, 37 Envtl. Quality, 2008, at 516 [hereinafter Aneja].
[186] USGS Fact Sheet at 2.
[187] Aneja at 516.
[188] Aneja at 515-16.
[189] *See generally* Pinder, *supra* note 163.
[190] USGS Fact Sheet at 3, *see* Figure 5; *See also* National Atmospheric Deposition Program, 2009 ammonium ion wet deposition map, http://nadp.sws.uiuc.edu/ (last visited Mar. 18, 2011).
[191] USGS Fact Sheet at 2.
[192] *Id*.
[193] Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, *Moving Forward on Gulf Hypoxia Annual Report 2009*, 4 (2009), *available at* http://www.epa.gov/msbasin/implementation.htm (last visited Mar. 18, 2011).

Mississippi River watershed over the past 50 years, this dead zone is currently the largest in the U.S. and the second largest in the world.[194]

Though all sources of nitrogen and other nutrients contribute to eutrophication of waterways, in some watersheds, nitrogen deposition comprises a significant fraction of the total nitrogen load. One study of nutrient pollution sources found that coastal areas that export large amounts of nitrogen via water received 18 percent of that nitrogen from deposition – even more than the 15 percent from livestock waste runoff.[195] In the Chesapeake Bay, one of the United States' most recreationally, culturally, and economically significant water bodies, EPA has estimated that more than a third of the total nitrogen pollution entering the Bay comes from air deposition.[196] Areas with the highest concentrations of CAFOs see even greater impacts from nitrogen deposition; for example, research indicates that "[a]tmospheric deposition of nitrogen compounds may contribute as much as 35 to 60% of total nitrogen loading to North Carolina coastal waters."[197]

Re-deposited airborne ammonia also comprises a significant fraction of total nitrogen deposition in areas with ammonia emission sources; studies demonstrate that ammonia sources significantly affect overall nitrogen deposition on a local and regional scale. Pinder et al. used EPA's Community Multiscale Air Quality (CMAQ) chemical transport model to map nitrogen deposition, and found that total nitrogen deposition near ammonia sources increases 10 to 40 percent.[198] Another study collected precipitation and measured its ammonium concentration, then used regression modeling to analyze the impact of ammonia sources on regional deposition.[199] The researchers found that areas with densely grouped CAFOs "will have a local impact" on both ammonia and ammonium aerosol deposition, and "may have a regional influence" on ammonium deposition.[200] The study found that CAFO emissions caused increases in ammonium deposition as far as 80 kilometers away.[201]

Despite an atypically small dead zone in 2009, the most recent five-year average size of the Gulf dead zone was 15,650 square kilometers. *Id*.

[194] EPA, *Hypoxia in the Northern Gulf of Mexico, an Update by the EPA Science Advisory Board*, EPA-SAB-08-003, 10-12 (Dec. 2007), available at: http://yosemite.epa.gov/sab/SABPRODUCT.NSF/C3D2F27094E03F90852573B800601D93/$File/EPA-SAB-08-003complete.unsigned.pdf (last visited Mar. 18, 2011).

[195] Robert W. Howarth et al., *Sources of Nutrient Pollution to Coastal Waters in the United States: Implications for Achieving Coastal Water Quality Goals*, 25 Estuaries 656, 668 (Aug. 2002) [hereinafter Sources of Nutrient Pollution].

[196] EPA, Office of Enforcement and Compliance Assurance, Chesapeake Bay Compliance and Enforcement Strategy at 2 (May 2010) [hereinafter Chesapeake Enforcement Strategy], *available at* http://www.epa.gov/oecaerth/civil/initiatives/chesapeake-strategy-enforcement.pdf (last visited Mar. 18, 2011).

[197] Aneja at 517.

[198] Pinder at 1.

[199] John T. Walker et al., *Atmospheric Transport and Wet Deposition of Ammonium in North Carolina*, 34 Atmospheric Env't., 2000.

[200] *Id*. at 3408.

[201] *Id*. at 3416.

The National Atmospheric Deposition Program‟s data lend support to these findings, showing that ammonium deposition has been heavily concentrated in the livestock-intensive Upper Midwest over the past decade and is increasing in concentration in the region.[202] EPA‟s own findings in the Chesapeake Bay also show the regional influence of ammonia on Bay water quality. Despite the thousands of point sources discharging nitrogen directly to the Bay via surface waters, the agency‟s Office of Enforcement and Compliance Assurance (OECA) has recently estimated that six percent of the total nitrogen loadings in the Bay come from deposition of emissions from livestock manure and fertilized soil.[203]

Moreover, the results of the CMAQ modeling study suggest that increased regulation of NO_x and SO_2 will increase both ambient ammonia concentrations and localized nitrogen deposition near ammonia sources in the future. Increased CAA controls on NO_x and SO_2 will reduce ambient levels of these pollutants, which will reduce conversion of ammonia into ammonium aerosols that have greater transport potential.[204] Ammonia emissions are also expected to rise due to projected increases in livestock production and concentration. As a result of both factors, more ammonia will re-deposit within a shorter distance from emissions sources.[205] Specifically, the modeling indicated that "the total nitrogen deposition decreases in the future, except near ammonia emission sources. The largest future increases in total nitrogen deposition can be found in and around areas of high ammonia emissions, including the Delmarva Peninsula, eastern North Carolina, and northeastern Georgia."[206]

Additional studies have linked those areas where ammonia deposition plays a significant role in nitrogen loadings with areas near intensive animal production,[207] indicating again that much volatilized ammonia re-deposits within a small range of its source and has a considerable effect on water quality. Moreover, it is not only animal numbers and proximity, but also livestock production methods, that affect nitrogen deposition; the use of CAFO livestock production systems increases the total amount of ammonia volatilized from livestock, and therefore the amount that eventually re-deposits in waterways. Nutrient researchers have found that keeping cows on pasture, as opposed to in barns, reduces volatilization of ammonia by more than half.[208] These studies indicate that protecting water quality from nutrient pollution requires EPA to consider and regulate ammonia emissions from CAFOs.

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[202] National Atmospheric Deposition Program, Map Viewer, http://nadp.sws.uiuc.edu/maps/ (view Network: NTN, Map Type: Deposition, Analyte: NH_4) (last visited Mar. 18, 2011).
[203] Chesapeake Enforcement Strategy at 9. An additional 17 percent of the Bay‟s total nitrogen load comes from animal manure directly via water. *Id*.
[204] Pinder at 1.
[205] *Id*. at 3.
[206] *Id*. at 4.
[207] Donald F. Boesch, *Challenges and Opportunities for Science in Reducing Nutrient Over-enrichment of Coastal Ecosystems*, 25 American Scientist 896 (Aug. 2002).
[208] Sources of Nutrient Pollution at 663.

Ammonia deposition onto land also degrades soil quality. According to the National Atmospheric Deposition Program, "[w]hen an ammonium ion deposits to a soil surface, it can increase soil acidity through nitrification reactions, releasing hydrogen ions and converting ammonium to nitrate."[209] Acidified soil provides poor growing conditions for vegetation by depleting calcium and other nutrients from the soil, mobilizing inorganic aluminum, and increasing the accumulation of nitrogen and sulfur in the soil.[210] High levels of aluminum can be toxic to plants, fish, and other organisms.[211] In addition, when nitrogen deposits onto soil it benefits species that need a large supply of nitrogen, resulting in these species overtaking those adapted to a limited nitrogen supply.[212] Thus nutrient enrichment can degrade terrestrial ecosystems just as eutrophication devastates aquatic ecosystems. Recent studies suggest that acidic deposition has played a part in the decrease in tree species such as red spruce and sugar maple in the eastern United States.[213]

In accordance with the CAA's broad mandate to protect against threats to public welfare, this petition requests that EPA consider the entire nitrogen cycle when regulating ammonia. Public welfare encompasses the social benefits derived from protecting clean water, healthy and productive soils, natural vegetation, and the enjoyment of natural resources. Ammonia deposition significantly degrades water quality, and in doing so diminishes use, enjoyment, and economic value of surface waters for fishing, recreation, and municipal use. Ammonia deposition also harms soil quality, which lowers cropland productivity as well as the diversity, health, and recreational value of forest ecosystems. Regulating ammonia as a criteria pollutant would reduce total ammonia air emissions and the resulting deposition of ammonia into surface waters in the most polluted areas. Adequate regulation through the implementation of protective secondary NAAQS would benefit both air and water quality, thereby furthering EPA's mission to protect public welfare from air pollution.

iii. Ambient ammonia reduces property values

Ammonia emissions also harm public welfare by causing damage to and deterioration of property and economic values. CAA § 302(h). Much of this harm to property value and rural economies stems from the quality of life issues already discussed. CAFOs may adversely affect quality of life and property value nearby in several ways, such as air pollution, water pollution, noise, dust, flies, and increased traffic. But as discussed previously, the Iowa Study found that

[209] National Atmospheric Deposition Program, Passive Ammonia Monitoring Network http://nadp.sws.uiuc.edu/nh3Net/ (last visited Mar. 18, 2011).
[210] Driscoll, Charles, et. al. *Effects of acidic deposition on forest and aquatic ecosystems in New York State*. Environmental Pollution 123 (2003) 327–336 [hereinafter Driscoll], *available at* http://www.esf.edu/hss/HF%20Ref%20PDF/EvnPol.123.327.336.pdf (last visited Mar. 18, 2011).
[211] *Id.*
[212] Dep't of Environment, Food & Rural Affairs, *Ammonia in the UK* 25 (2002), *available at* http://www.defra.gov.uk/environment/quality/air/airquality/publications/ammonia/documents/ammonia-in-uk.pdf (last visited Mar. 18, 2011).
[213] Driscoll at 327–336.

citizens near CAFOs have identified odor and air pollution as the leading CAFO nuisances contributing to decreased quality of life.[214] In many rural communities, homeowners living near CAFOs find themselves unable to sell their homes and relocate because CAFO air pollution, including ammonia emissions, makes their home undesirable, thereby dramatically lowering its market value. Both case law and academic research reflect a growing acceptance of the fact that CAFOs have an adverse economic impact on nearby residences. Odor and air pollution have a negative effect on quality of life, and therefore significantly affect the amount a buyer will be willing to pay.

In one recent case, *Darnall Ranch, Inc. v. Banner County Board of Equalization*, the Supreme Court of Nebraska held that the state tax board acted unreasonably and arbitrarily in failing to adjust Darnall"s home value downward due to its proximity to a large cattle feedlot.[215] Discussing a prior hog CAFO case, the Court stated plainly that "[n]o reasonable fact finder could conclude that in the real estate marketplace, a potential buyer would not notice, and react economically, to having a large hog facility very nearby while living in a remote location."[216] In 2002, an Iowa District Court similarly held that the construction of a large hog CAFO reduced one neighbor"s property value by $50,000, and awarded $100,000 in damages.[217]

Economic studies have also found that CAFOs reduce the value of nearby property. One Missouri study found that every Missouri CAFO lowered surrounding property values by approximately *$2.68 million*.[218] This translated to an average value loss of 6.6 percent within a three-mile radius, and an average value loss of more than 88 percent for those properties within a quarter mile of the CAFO.[219] The Union of Concerned Scientists roughly extrapolated this finding, concluding that if every CAFO had a similar impact, CAFOs cost the United States as much as *$26 billion* in lowered property values.[220]

The Appraisal Journal has also addressed how CAFOs impact property values; a 2001 article on the issue advised that appraisers should consider the effects of nearby CAFOs on use and enjoyment of property when evaluating rural homes. The author reviewed published research and several case studies on the effects of CAFOs on property value, concluding that "diminished marketability, loss of use and enjoyment, and loss of exclusivity can result in a

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[214] Iowa Study at 149-50.
[215] *Darnall Ranch, Inc. v. Banner Co. Bd. of Equal.*, 753 N.W.2d 819 (Neb. 2008).
[216] *Id*. at 831, quoting *Livingston v. Jefferson Cty. Bd. of Equal.*, 640 N.W.2d 426 at 437 (2002).
[217] *Judge awards Iowa couple $100,000 in hog lot lawsuit*, AMARILLO GLOBE NEWS, Jan. 12, 2002, *available at* http://www.pmac.net/AM/hoglot_lawsuit.html (last visited Mar. 18, 2011). For additional cases finding devaluation of property from nearby CAFOs, *see* http://www.factoryfarmtaxprotest.org/cases.htm.
[218] Mubarak, H., T.G. Johnson, and K.K. Miller. 1999. *The impacts of animal feeding operations on rural land values*. Report R-99-02. College of Agriculture, Food and Natural Resources, University of Missouri–Columbia.
[219] *Id*.
[220] Union of Concerned Scientists, *CAFOs Uncovered: The Untold Costs of Confined Animal Feeding Operations* (April 2008) at 5.

diminishment ranging from 50% to nearly 90% of otherwise unimpaired value."[221] A Pennsylvania study has since found that the prices of homes adjacent to CAFOs decrease once the total live weight of confined animals exceeds 200,000 pounds.[222]

A community located in Princess Anne, Maryland puts property value impacts into perspective. As has happened in rural communities throughout the U.S., homeowners purchased houses on a rural residential street, and large poultry CAFOs subsequently moved in and surrounded the homes at close proximity. As this photograph shows, formerly desirable homes are now, among other things, exposed to ammonia pollution from all directions.[223] Common sense dictates that such a community transformation, with accompanying air and water pollution, traffic, dust, noise, and flies, will affect the price any potential buyer would be willing to pay. CAFO air pollution, including ammonia, plays a central role in decreased property values, thereby harming public welfare.

Princess Ann, Maryland, February 5, 2009

[221] J.A. Kilpatrick, *Concentrated Animal Feeding Operations and Proximate Property Values*, 39 The Appraisal J. 3 (2001) at 306.
[222] R.C. Ready and C.W. Abdalla, *The Amenity and Disamenity Impacts of Agriculture: Estimates from a Hedonic Pricing Model*, 87 Am. J. of Agric. Econ. 2 (2005) at 314-326.
[223] Princess Anne, MD on February 5, 2009, photograph from the Assateague Coastal Trust and the Assateague COASTKEEPER.

iv. Ambient ammonia impairs visibility in pristine areas

Ammonia emissions also harm public welfare by impairing visibility and damaging property and economic values in scenic areas. EPA has assessed the impact of air pollution on visibility, finding that "[i]n our nation's scenic areas, the visual range has been substantially reduced by air pollution. In eastern parks, average visual range has decreased from 90 miles to 15-25 miles. In the West, visual range has decreased from 140 miles to 35-90 miles."[224] Ammonia has significantly contributed to this damage. Emissions research has established that the reactive nitrogen in ammonia "has a variety of environmental consequences including acidification and eutrophication, photo-chemical air pollution [and] reduced visibility.[225] As discussed, ammonia gas reacts with nitrous oxides and sulfur dioxide to form small aerosol particles harmful to human health; these same light-scattering aerosol particles do further damage by forming the regional haze that limits visibility in many of the nation's scenic and wild places.[226]

For example, the Oregon Department of Environmental Quality has identified ammonia emissions – specifically emissions from the region's dairy CAFOs – as a significant contributor to regional haze and impaired visibility in the Columbia Gorge National Scenic Area.[227] State officials also recognize that ammonia's contribution to acid rain in the Gorge threatens cultural and natural resources.[228] EPA must consider these impacts when assessing ammonia's effects on public welfare, and should establish secondary NAAQS that will protect visibility in wilderness and culturally significant areas for enjoyment by all Americans.

C. Ammonia in the ambient air results from numerous stationary sources

To qualify for listing as a criteria pollutant, ammonia must exist in the air as a result of "numerous or diverse mobile or stationary sources." CAA § 108(a)(1)(B). Ammonia meets these threshold requirements, because CAFOs qualify as stationary sources, and numerous CAFOs emit ammonia into the ambient air.

1. CAFOs are stationary sources

Section 302(z) of the CAA defines stationary sources broadly, stating "[t]he term "stationary source" means generally any source of an air pollutant except those emissions

[224] EPA, Visibility: Basic Information, *available at* http://epa.gov/oar/visibility/what.html (last visited Mar. 18, 2011).
[225] Aneja at 517.
[226] Or. Dep't of Envtl. Quality, Fact Sheet: Columbia Gorge Air Quality Strategy Report (2008), *available at* http://www.deq.state.or.us/aq/factsheets/08aq002_gorge.pdf (last visited Mar. 18, 2011).
[227] *Id*.
[228] *Id*.

resulting directly from an internal combustion engine for transportation purposes or from a nonroad engine or nonroad vehicle as defined in section 7550 of this title."

CAFOs clearly meet the definition of stationary source: they emit ammonia, an air pollutant, into the air and are not internal combustion engines, nonroad engines, or nonroad vehicles. Under the statute, "any" other source of an air pollutant qualifies as a stationary source. Thus, the CAA's broad language indicates that the law does not limit the term "stationary source" to any particular sector, and CAFOs qualify as stationary sources under CAA § 302(z).

2. CAFOs are numerous

Many thousands of CAFOs contribute to air pollution throughout the United States. Though the CAA does not set a threshold number for "numerous" sources and case law does little to clarify this standard,[229] these facilities exist in thousands of rural communities throughout the U.S., and do not only affect a small area or specific group of people. EPA's Final CAFO Rule identified an estimated total of 20,685 CAFOs nationwide in 2008.[230] In contrast, EPA regulates SO_2 as a criteria pollutant, 73 percent of which comes from the nation's 5,400 power plants.[231] Under any consistent interpretation of the term, CAFOs are numerous and therefore meet the CAA "numerous or diverse sources" requirement for stationary sources of designated criteria pollutants.

D. EPA has not yet issued air quality criteria for ammonia

Ammonia also satisfies the final CAA § 108(1)(C) requirement for listing as a criteria pollutant because EPA has not yet issued air quality criteria for the pollutant and did not do so before December 31, 1970.[232]

Ammonia therefore meets all of the legal requirements for listing under §108 of the CAA: ammonia is a pollutant as defined by the CAA, emissions of which cause or contribute to air pollution which may reasonably be anticipated to endanger both public health and public

[229] In *NRDC v. Train*, 545 F.2d 320 (2nd Cir. 1976), EPA conceded that lead-emitting automobiles were "numerous or diverse mobile or stationary sources," and thus the court did not have to address the issue and did not set a threshold for numerous sources. *Id*. at 324. No other case petitioners are aware of clarifies the requirement that sources be numerous.

[230] Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines for Concentrated Animal Feeding Operations in Response to the Waterkeeper Decision: Final Rule, 40 C.F.R. Parts 9, 122, 412 (2008); 73 Fed. Reg. 70418 at 70469-70470.

[231] EPA, Fact Sheet: Revisions to the National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide, *available at* http://www.epa.gov/air/sulfurdioxide/pdfs/20100602fs.pdf (last visited Mar. 18, 2011); U.S. Energy Information Administration, Frequently Asked Questions, http://www.eia.doe.gov/ask/electricity_faqs.asp#coal_plants (last updated Jan. 24, 2011).

[232] As discussed *infra* Section VII, an EPA "plan" to issue air quality criteria for a pollutant is not a requirement for listing; once EPA makes findings under CAA § 108(a)(1)(A) and (B), listing becomes mandatory.

welfare, the emissions are present in the ambient air as the result of numerous stationary sources, including CAFOs, and EPA has yet to issue air quality criteria for ammonia.

VI. EPA CURRENTLY REGULATES SIMILAR EXPOSURES UNDER THE NAAQS PROGRAM

EPA's existing NAAQS already regulate sulfur dioxide (SO_2), a criteria pollutant with characteristics similar to ammonia, and which requires standards similar to those that are necessary to protect public health and welfare from ammonia pollution. As with brief exposures to SO_2, acute ammonia exposures pose a public health threat. And similar to SO_2, which EPA has found does not affect the entire U.S. public but rather impacts pockets of the population near major sources, ammonia emissions primarily impact geographically discrete rural communities throughout the U.S.

EPA has regulated SO_2 as a criteria pollutant since 1971.[233] To protect public health from exposure to SO_2 emitted by power plants and industrial facilities, EPA initially set a 24-hour standard of 140 ppb and a one-year standard of 30 ppb.[234] However, subsequent research on the health effects of SO_2 led EPA to determine that short-term exposures – between 5 minutes and 24 hours – pose the most significant health threats, and therefore primary NAAQS should protect health from short-term spikes in SO_2 concentrations. These acute SO_2 exposures can worsen asthma symptoms and cause respiratory effects such as narrowing of the airways.[235] To better protect vulnerable citizens from short-term SO_2 exposures, EPA recently revoked both the 24-hour and the one-year primary NAAQS and replaced them with a one-hour primary NAAQS of 75 ppb.[236]

EPA's new one-hour SO_2 NAAQS reflects a growing understanding of the acute risks posed by certain toxic emissions, and provides the necessary framework to similarly regulate ammonia. EPA's own ammonia AEGLs document the risks of acute ammonia exposures; the agency's research reports the potential for adverse health effects at concentrations of 30 ppm after as few as 10 minutes.[237] Moreover, EPA's NAEMS data show that ammonia emissions from CAFOs fluctuate significantly, exposing nearby residents to short-term spikes in ammonia concentrations that exceed both levels and durations of concern.[238] EPA should evaluate available ammonia emissions data, considering both existing health-based exposure standards and heightened health effects of mixed-pollutant exposures, and establish a standard that will protect the public from the acute ammonia health effects it determines are likely to occur near

[233] Primary National Ambient Air Quality Standard for Sulfur Dioxide; Final Rule, 75 Fed. Reg. 35,520 at 35,522 (June 22, 2010) [hereinafter Primary SO_2 NAAQS].
[234] Primary SO_2 NAAQS at 35,521, 35,524.
[235] EPA, Fact Sheet: Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide, 2, *available at* http://www.epa.gov/air/sulfurdioxide/pdfs/20100602fs.pdf.
[236] Primary SO_2 NAAQS at 35,520.
[237] EPA, Ammonia Acute Exposure Guideline Levels, http://www.epa.gov/opptintr/aegl/pubs/results88.htm.
[238] *See* discussion of EPA's NAEMS data, *supra* Section V.B.1.iii.b.

CAFOs. In addition, because much of the existing research on ambient ammonia levels near CAFOs involves time-averaged data, EPA should consider the fact that spikes in ambient ammonia levels have not been thoroughly documented when establishing an adequate margin of safety in its standards.

EPA's SO_2 rulemaking also sets a precedent for regulating pollutants whose health effects are significant, but not ubiquitous. The new standard resulted from a challenge to the agency's 1997 decision not to modify the SO_2 NAAQS, despite its finding that short-term exposures below the previous standards posed a health threat to asthmatics. EPA had determined that a more stringent five-minute health standard was not necessary when it considered SO_2 "from a national perspective," finding that the health threat was not adequately ubiquitous and the likelihood that a susceptible individual would suffer adverse health effects was low.[239] The American Lung Association and the Environmental Defense Fund successfully challenged this decision in the District of Columbia Circuit, which held that "nothing in the Final Decision explains away the possibility that 'localized,' 'site-specific,' or even 'infrequent' events might nevertheless create a public health problem, particularly since, in some sense, all pollution is local and site-specific…."[240]

EPA should apply this analysis to ammonia, which primarily affects rural residents near CAFOs. While ambient ammonia levels likely do not pose a significant health threat in most urban areas, and therefore may not affect the majority of the public, the D.C. Circuit made clear that even localized, site-specific, and infrequent ambient air pollution may create a public health risk that meets the standard in § 108 and therefore requires CAA regulation. In its final SO_2 rule, EPA further pointed out that "in selecting primary standards that include an adequate margin of safety, the Administrator is seeking not only to prevent pollution levels that have been demonstrated to be harmful but also to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree."[241] EPA should adopt the same cautious approach regulating ambient ammonia, the adverse health effects of which have been documented but which has not been rigorously studied by EPA, particularly in combination with other air pollutants. And as with the SO_2 rule, EPA should require ambient air monitoring for ammonia in areas with an "increased coincidence of people and [ammonia] emissions."[242]

[239] *Id*. at 35,522.
[240] *Id*. at 35,523, quoting *American Lung Ass'n v. EPA*, 134 F.3d 388, 392 (D.C. Cir. 1998).
[241] *Id*. at 35,521.
[242] *Id*.

VII. EPA SHOULD CONSIDER ENVIRONMENTAL JUSTICE CONCERNS WHEN DECIDING WHETHER TO REGULATE AMMONIA

EPA must consider environmental justice concerns regarding ammonia emissions when deciding whether to regulate ammonia. Executive Order 12,898 directs all agencies to consider environmental justice concerns during the decision-making process.[243] EPA has acted to effectively implement this Order through its recently issued Interim Guidance regarding environmental justice.[244] The Interim Guidance sets out two primary environmental justice concerns for the agency: ensuring fair treatment and enabling meaningful involvement of those impacted by EPA actions.[245] Fair treatment requires that "no group of people should bear a disproportionate burden of harms and risks," including the "negative environmental consequences" of governmental policies.[246] To achieve meaningful involvement by impacted communities, those potentially affected must have an appropriate role in decisions that may affect their environment or health.[247] Simply permitting input does not satisfy this obligation; EPA decision-makers have committed to actively "seek out and facilitate the involvement of those potentially affected."[248]

EPA's decision whether to regulate ammonia from factory farms involves an environmental justice concern, because certain communities are disproportionately impacted by the pollution from these operations and have been excluded from meaningful participation in decisions regarding their siting and regulation. In addition, EPA's response to this petition will constitute an "action that involves an environmental justice concern," because it "present[s] opportunities to address existing disproportionate impacts on minority, low-income, or indigenous populations that are addressable through the action."[249] CAFO ammonia pollution implicates nearly all of the primary factors EPA's Interim Guidance identifies as consideration factors for decision-making processes: (1) proximity and exposure to environmental hazards, (2) susceptible populations, (3) unique exposure pathways, (4) multiple and cumulative effects, and (5) ability to participate in the decision-making process.[250] As discussed throughout this petition, CAFOs are the largest source of ammonia emissions in the US, and thus the environmental justice analysis EPA conducts when reviewing this petition must address communities impacted by CAFO air pollution.

[243] Exec. Order 12,898 (1994).
[244] EPA, EPA's Action Development Process: Interim Guidance on Considering Environmental Justice During the Development of an Action (July 2010).
[245] *Id*. at 3.
[246] *Id*.
[247] *Id*.
[248] *Id*.
[249] *Id*. at 6.
[250] *Id*. at 7-8.

Peer-reviewed sociological studies have shown that CAFOs are disproportionately located in communities with low socioeconomic status and frequently in predominantly African-American communities. One 2006 study of seventh and eighth grade students in North Carolina found an association between economic disadvantage and "proximity to the nearest hog CAFO and with strength of the odor."[251] The study found two other troubling correlations: populations already vulnerable to asthma and other illnesses are more likely to be exposed to CAFO emissions such as ammonia,[252] and schools with a high non-white population and a low socioeconomic status were more likely than other schools to have hog CAFOs nearby.[253] A 2011 study of 16 North Carolina communities concluded that in general, "[i]ndustrial hog operations in North Carolina are disproportionately located in low-income communities of color."[254]

Another study looked at placement and expansion of large hog CAFOs in 17 states, including three states where large-scale production had been rapidly expanding: North Carolina, Iowa, and Minnesota. In these three states, the researchers found disproportionate siting and expansion of large hog CAFOs in African-American communities in the 1980s and 1990s, and concluded that as hog production shifts from small-scale to large-scale, racial inequity in CAFO siting intensifies.[255]

Yet another study investigated hog CAFO siting in Mississippi, looking both state-wide and specifically in the counties with hog production, to determine whether hog CAFOs sited disproportionately in areas with higher poverty or higher percentages of African-American residents.[256] The study found three times as many hog CAFOs in (1) high African-American, low poverty and (2) high poverty, low African-American communities as compared to a control.[257]

EPA should consider the combined effects of the increasing geographic concentration of CAFOs, the adverse effect CAFOs have on nearby property values, and the disproportionate siting of CAFOs in low-income and minority communities when assessing the environmental justice impact of CAFO ammonia emissions. These factors exacerbate existing inequity, as low-income residents who already have the lowest mobility will become even less able to escape pollution as property values decline and more CAFOs move into an area. Citizens who live close to CAFOs and who breathe ammonia pollution every day frequently will not have the

[251] Maria C. Mirabelli, Steve Wing, Stephen W. Marshall & Timothy C. Wilcosky, *Race, Poverty, and Potential Exposure of Middle-School Students to Air-Emissions from Confined Swine Feeding Operations* 114 Envtl. Health Persp. 591, 593 (April 2006).
[252] *Id*. at 591, 594.
[253] *Id*. at 595.
[254] Schinasi, *supra* note 109 at 7.
[255] Jeremy Arney, Janice E. Johnston, & Paul B. Stretesky, *Environmental Inequity: An Analysis of Large-Scale Hog Operations in 17 States, 1982-1997* 68 Rural Sociology 231, 244 (2003).
[256] Sacoby M. Wilson, et al., *Environmental Injustice and the Mississippi Hog Industry*, 110 Envt'l Health Perspectives 2 (April 2002).
[257] *Id*. at 199.

means to uproot their lives and families to move to a safer, less polluted community – nor should they have to.

The petitioners request that EPA recognize the environmental justice issues that underlie regulation of ammonia and make environmental justice a primary goal when determining whether to regulate it. This consideration should involve targeted outreach to communities near large or numerous CAFOs and active solicitation of public input from these stakeholders. EPA should base its determination of what constitutes protective regulation and fair treatment on the most adversely impacted communities and the most susceptible individuals, rather than simply assessing average ammonia concentrations in all rural communities.

VIII. EPA HAS A DUTY TO MAKE AN ENDANGERMENT FINDING AND REGULATE AMMONIA

In *Massachusetts v. EPA*,[258] the Supreme Court clarified EPA's obligations to make endangerment findings for air pollutants under the CAA.[259] In its discussion of EPA's discretion to determine, in the administrator's judgment, whether to make an endangerment finding for an air pollutant, the Court noted that "the use of the word "judgment" is not a roving license to ignore the statutory text." Rather, the exercise of this judgment "must relate to whether an air pollutant 'cause[s], or contribute[s] to, air pollution which may reasonably be anticipated to endanger public health or welfare.'"[260] When EPA issues its response to a petition for rulemaking "its reasons for action or inaction must conform to the [CAA]," and EPA can only decline to act if it either finds that no endangerment exists or "provides some reasonable explanation as to why it cannot or will not exercise its discretion" to make an endangerment finding one way or another.[261]

Ammonia is a known and extensively researched toxin, for which "sufficient information exists to make an endangerment finding."[262] EPA and other federal agencies, as well as numerous peer-reviewed studies, have extensively documented ammonia's adverse health and welfare impacts, and EPA lacks the requisite "scientific uncertainty…so profound that it precludes EPA from making a reasoned judgment"[263] as to endangerment. Similarly, EPA lacks reasonable grounds on which to make a finding that ammonia does not endanger public health or

[258] *Massachusetts v. EPA*, 549 U.S. 497 (2007).
[259] Though the Court addressed the endangerment language in § 202(a), emissions standards for new motor vehicles, the language is substantially identical to the endangerment language in § 108(a). The Court's reasoning relied on the plain language of the statute, and therefore also applies to endangerment findings under § 108(a). EPA has not interpreted these provisions as having significantly different meanings, and thus the "normal rule of statutory construction that identical words used in different parts of the same act are intended to have the same meaning" applies. *Gustafson v. Alloyd Co., Inc.*, 513 U.S. 561, 569 (1995) (internal quotation marks and citations omitted).
[260] *Mass v. EPA* at 532-33.
[261] *Id*. at 533.
[262] *Id*. at 534.
[263] *Id*.

welfare. Consequently, a failure to initiate a rulemaking that proposes an endangerment finding for ammonia would be arbitrary and capricious.

If EPA makes an endangerment finding for ammonia, the finding will trigger a mandatory duty to list ammonia as a criteria pollutant. CAA § 108(a)(1) requires that the EPA Administrator "shall" list pollutants that meet the previously discussed requirements of (A) and (B), and "for which air quality criteria had not been issued before December 31, 1970, but for which [s]he plans to issue air quality criteria under this section." CAA § 108(a)(1)(C). In *NRDC v. Train*, the Second Circuit clarified that the latter provision of part (C) does not give EPA discretion to choose not to list a pollutant for which it made an endangerment finding because it has no "plans" to do so.[264] Rather, the court found conclusively that "[o]nce the conditions of §§ 108(a)(1)(A) and (B) have been met, the listing of [the pollutant] and the issuance of air quality standards for [the pollutant] become mandatory."[265]

Because ammonia meets the legal requirements above, the petitioners request that EPA review the scientific data regarding ammonia, make an endangerment finding, and determine that it must list ammonia as a criteria pollutant. The petitioners further request that EPA then establish both primary and secondary NAAQS for ammonia under §109 of the CAA for the protection of public health and public welfare with an adequate margin of safety.

IX. CONCLUSION

This petition requests that EPA regulate ammonia as a criteria pollutant under the CAA. Ammonia meets all of the legal requirements for listing as a criteria pollutant, and numerous peer-reviewed studies show that ambient ammonia endangers both public health and public welfare. CAA § 109(d)(1) gives EPA authority to re-evaluate the criteria and promulgate new standards for pollutants at its discretion, provided it completes a thorough review every five years, and the petitioners respectfully request that EPA undertake a review of ammonia without delay. An unreasonable delay responding to this petition, an arbitrary and capricious denial of this petition, or a scientifically unsubstantiated failure to make an endangerment finding will subject EPA to judicial review under Administrative Procedure Act[266] (APA) § 706(1), APA § 706(2)(A), or CAA § 304(a)(2).

[264] *NRDC v. Train*, 545 F.2d 320 (2nd Cir. 1976).
[265] *Id*. at 328. EPA recently questioned this 34-year old precedent in its *Advanced Notice of Proposed Rulemaking: Regulating Greenhouse Gas Emissions Under the Clean Air Act*, 73 Fed. Reg. 44,354 at 44,477 FN 229 (2008). Although EPA has postulated that the subsequent establishment of *Chevron* deference could lead to a different outcome than under the NRDC court, that court used an analysis that would now clearly fall under *Chevron* "step 1," in finding that the statute"s plain language, structure, and legislative history "leave no room for interpretation" and impose a mandatory duty on EPA. *NRDC v. Train*, 545 F.2d at 328. Thus, an effort to overturn this precedent would likely fail.
[266] Administrative Procedure Act, 5 U.S.C. §§ 551-559; 701-706 (2006).

As previously discussed, the petitioners assert that the scientific record on ammonia"s threat to public health gives rise to an affirmative duty by EPA to make an endangerment finding and regulate ambient ammonia. Thus, the petitioners will deem a failure by EPA to make such a finding and initiate a rulemaking to designate ammonia as a criteria pollutant a "failure…to perform any act or duty…which is not discretionary," which is subject to judicial review under the citizen suit provision of the CAA. CAA § 304(a)(2).

The petitioners request that EPA respond to this petition in a timely manner by making an endangerment finding for ammonia and determining that it will regulate ammonia under CAA §§108 and 109 for the protection of public health and public welfare. The APA provides the petitioners with the right to petition EPA for a rulemaking to list ammonia as a criteria pollutant, and also obligates EPA to respond "with due regard for the convenience and necessity of the parties" and "within a reasonable time…proceed to conclude a matter presented to it." APA § 555(b). CAFOs have escaped regulation for their air emissions for decades, and rural citizens whose health have been and continue to be harmed by airborne ammonia require swift action by EPA. Therefore, in determining what constitutes a reasonable time for response to this petition, the petitioners urge EPA to consider that "human health and welfare are at stake."[267]

Respectfully Submitted,

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[267] *See In Re. American Rivers & Idaho Rivers United, Petitioners*, 372 F.3d 413, 418 (D.C. Cir. 2004).

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Exhibit B

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March 1, 2016

Via Certified Mail

Ms. Gina McCarthy
Administrator
U.S. Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Notice of Intent to Sue for Unreasonable Delay in Responding to a Petition for the Regulation of Ammonia as a Criteria Pollutant

Dear Administrator McCarthy,

We are writing on behalf of Iowa Citizens for Community Improvement, Clean Wisconsin, Center for Food Safety, The Humane Society of the United States, the Association of Irritated Residents, Food & Water Watch, and the Environmental Integrity Project ("Plaintiffs") to provide you with notice of our intent to file suit against the U.S. Environmental Protection Agency (EPA) and you, in your official capacity as Administrator of EPA, for unreasonable delay in responding to our April 5, 2011 "Petition for the Regulation of Ammonia as a Criteria Pollutant Under Clean Air Act Sections 108 and 109" ("Petition," Attachment A).

Our 2011 Petition specifically requested that EPA use its authority under the federal Clean Air Act (CAA), 42 U.S.C. §§ 7401 *et seq*., to find that ammonia endangers public health and welfare, to designate ammonia as a CAA "criteria pollutant" under CAA § 108, and to establish National Ambient Air Quality Standards (NAAQS) for ammonia in the ambient air to protect public health and welfare with an adequate margin of safety under CAA § 109. Attachment A, at 1.

As explained in the Petition, ammonia gas harms public health and welfare in numerous ways, including directly causing acute and chronic respiratory health impacts; mixing with other pollutants to form fine particulate matter, which causes respiratory symptoms, decreased lung function, aggravated asthma symptoms, heart disease, and

premature death; decreasing quality of life in rural communities; polluting water and soil through deposition; creating regional haze that reduces visibility in parks and other scenic places; and decreasing property values. Large livestock operations are the leading source of ammonia gas emissions in the U.S.

Despite the significant and growing body of scientific research demonstrating that ambient ammonia pollution emitted by animal feeding operations (AFOs), concentrated animal feeding operations (CAFOs), and other sources cause and contribute to air pollution that endangers public health and welfare, EPA has not acted to directly regulate this pollutant under the CAA, and, as a result, thousands of sources continue to emit ammonia pollution unabated. CAFOs are not currently required to meet any testing, performance, or emission standards under the CAA.

Nearly five years have passed since EPA received the 2011 Petition. EPA has not formally responded or taken any meaningful action on the Petition. Records obtained in May 2014 pursuant to a July 2013 Freedom of Information Act request indicate that EPA is not actively considering the Petition or moving toward a final determination on the Petition, but rather has yet to take the matter under any meaningful consideration. *See* Attachment B.

On January 28, 2015, Plaintiffs filed a complaint under the Administrative Procedure Act to remedy EPA's unreasonable delay in responding to the Petition. *Envtl. Integrity Project v. United States Envtl. Prot. Agency*, No. 15-0139 (ABJ), 2015 WL 7737307, at *1 (D.D.C. Dec. 1, 2015). The Court dismissed the case after finding that the CAA's citizen suit provision "provides the cause of action" for an unreasonable delay claim, that the citizen suit provision requires plaintiffs to notify the EPA 180 days before filing suit, and that Plaintiffs had not provided notice. *Id.* at *10.

Accordingly, Plaintiffs are hereby providing notice of their intent to sue to remedy EPA's unreasonable delay under the CAA.[1] Section 304 of the CAA provides that the "district courts of the United States shall have jurisdiction to compel (consistent

[1] Plaintiffs do not concede that an Administrative Procedure Act claim is improper, nor do they waive the right to bring suit under both the CAA and the Administrative Procedure Act in the future. Plaintiffs The Humane Society of the United States, the Association of Irritated Residents, Center for Food Safety, and the Environmental Integrity Project are parties to another unreasonable delay suit involving a separate rulemaking petition submitted to EPA, which seeks the listing and regulation of CAFOs as stationary sources under the CAA. *See Humane Soc'y of the United States v. United States Envtl. Prot. Agency*, No. 15-141 (D.D.C. filed Jan. 28, 2015). This letter also does not in any way concede that the Administrative Procedure Act claim regarding that petition is improper.

with paragraph (2) of this subsection) agency action unreasonably delayed,"[2] and requires that citizen litigants provide notice to EPA 180 days before commencing an action for unreasonable delay. 42 U.S.C. § 7604(a). Under § 304(a), this letter serves to notify you that Plaintiffs intend to file suit against you in federal district court any time beginning 180 days from the postmarked date of this letter to cure the unreasonable delay discussed above. *See* 40 C.F.R. § 54.2 (a), (d).

Plaintiffs include the following organizations:

Plaintiff Environmental Integrity Project (EIP) is a national nonprofit organization headquartered in Washington, D.C. EIP is dedicated to advocating for more effective enforcement of environmental laws, including the CAA. EIP advocates for application of clean air laws to AFOs nationwide, because these operations endanger public health and welfare with their unrestricted pollution emissions. EIP also works to gather and analyze pollution data and provide this information to the public, and has been actively engaged in EPA's ongoing process, now stalled, to develop accurate tools to estimate AFO air pollution.

Plaintiff Center for Food Safety (CFS) is a national nonprofit membership organization dedicated to protecting human health and the environment by curbing the proliferation of harmful food production technologies, such as AFOs, and instead promoting sustainable agriculture. CFS represents over 700,000 farmer and consumer members throughout the country who support safe, sustainable agriculture. CFS's mission is to protect the public's right to know how their food is produced. CFS utilizes regulatory actions, citizen engagement, legislation, and when necessary, litigation, to promote transparency and accountability in the factory farm industry. CFS believes that EPA must regulate ammonia and other pollutants from factory farms in order to protect human health and the environment and create a healthier, safer food supply. CFS is located at 303 Sacramento St., 2nd Floor, San Francisco, CA 94111, and can be reached at (415) 826-2770.

Plaintiff The Humane Society of the United States (HSUS) is a nonprofit organization headquartered in the District of Columbia and incorporated in the State of Delaware. HSUS is the largest animal protection organization in the United States, representing millions of members and constituents. Since its establishment in 1954, HSUS has advocated against the inhumane treatment of animals raised for food. To that end, HSUS actively advocates for better laws to protect animals and the environment;

[2] Paragraph (2) provides that any person may commence a civil action "against the Administrator where there is an alleged failure of the Administrator to perform any act or duty under this chapter which is not discretionary with the Administrator." 42 U.S.C. § 7604(a)(2).

conducts mission-specific campaigns; and advocates against practices that injure, harass or otherwise harm animals, including farm animals. Specifically, with its mission to create a humane and sustainable world for all animals—including people and communities—HSUS endeavors to ensure that its members are aware of and not injured by hazardous substances, including ammonia, released by AFOs. HSUS has actively campaigned to regulate air pollutants emitted by AFOs through efforts with the EPA, in Congress, and in the Courts.

Plaintiff Iowa Citizens for Community Improvement (ICCI) is a nonprofit organization that works to empower and unite grassroots Iowans of all ethnic backgrounds to take control of their communities; involve them in identifying problems and needs and in taking action to address them; and be a vehicle for social, economic, and environmental justice. ICCI's thousands of members work to protect rural communities from factory farm air and water pollution at the state and national level. Many ICCI members live, farm, and recreate in rural Iowa, and are directly and adversely affected by AFO ammonia emissions. ICCI is located at 2001 Forest Avenue, Des Moines, Iowa 50311, and can be reached at 515-282-0484.

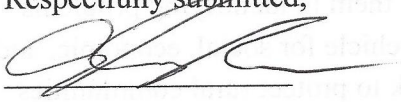
Plaintiff Association of Irritated Residents (AIR) is a California non-profit corporation that advocates for air quality and environmental health in the San Joaquin Valley, with members living in Kern, Kings, Tulare, Fresno, and Stanislaus counties. Members of AIR live, raise their families, work, and recreate in the San Joaquin Valley. They are adversely affected by exposure to levels of air pollution that exceed the health-based $PM_{2.5}$ air quality standards. The adverse effects of such pollution include actual or threatened harm to their health, their families' health, their professional, educational, and economic interests, and their aesthetic and recreational enjoyment of the environment in the San Joaquin Valley. On the basis of air quality issues, AIR has fought the growth of local dairy CAFOs in the San Joaquin Valley. For many years, AIR has requested that the San Joaquin Valley Air Pollution Control District regulate ammonia as a precursor to $PM_{2.5}$ because it forms ammonium nitrate in the winter. Wintertime $PM_{2.5}$ levels in Kern County, at the southern end of the San Joaquin Valley, are the worst in the nation. AIR is located at 29389 Fresno Avenue, Shafter, CA 93263, and can be reached at 661-910-7734.

Plaintiff Clean Wisconsin protects Wisconsin's clean water and air and advocates for clean energy by being an effective voice in the state legislature and by holding elected officials and polluters accountable. Clean Wisconsin's mission is to protect the special places that make Wisconsin such a wonderful place to live, work and play. Clean Wisconsin is located at 634 W. Main St. #300, Madison, WI 53703, and can be reached at 608-251-7020.

Plaintiff Food and Water Watch (FWW) is a national, non-profit consumer advocacy organization with its headquarters in Washington, D.C. and offices throughout the United States. FWW works to ensure safe food and clean water, advocating for safe, wholesome food produced in a humane and sustainable manner and the public, rather than private, control of water resources. For several years, FWW has advocated for stronger regulation of pollution from industrial livestock operations.

If you have any questions regarding this notice, or would like to discuss this matter further, please contact Abel Russ at the number or email address below.

Respectfully submitted,



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Attachment A:

April 5, 2011 Petition for the Regulation of Ammonia as a Criteria Pollutant Under Clean Air Act Sections 108 and 109

BEFORE THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL INTEGRITY PROJECT, ASSOCIATION OF IRRITATED RESIDENTS, CABALLO CONCERNED CITIZENS GROUP, CENTER FOR FOOD SAFETY, CITIZENS FOR PENNSYLVANIA'S FUTURE, CLEAN WISCONSIN, CRAWFORD STEWARDSHIP PROJECT, ENVIRONMENTALLY CONCERNED CITIZENS OF SOUTH CENTRAL MICHIGAN, FOOD & WATER WATCH, THE HUMANE SOCIETY OF THE UNITED STATES, ILLINOIS CITIZENS FOR CLEAN AIR AND WATER, IOWA CITIZENS FOR COMMUNITY IMPROVEMENT, JOHNS HOPKINS CENTER FOR A LIVABLE FUTURE, MIDWEST ENVIRONMENTAL ADVOCATES, NORTHWEST ENVIRONMENTAL DEFENSE CENTER, RIO VALLE CONCERNED CITIZENS, SIERRA CLUB, SOCIALLY RESPONSIBLE AGRICULTURAL PROJECT, SUSTAIN RURAL WISCONSIN NETWORK, VERNON COUNTY ALLIANCE CONCERNED WITH ENVIRONMENTAL SAFETY, AND WATERKEEPER ALLIANCE,

Petitioners

v.

LISA P. JACKSON, ADMINISTRATOR
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Respondent.

PETITION FOR THE REGULATION OF AMMONIA AS A CRITERIA POLLUTANT UNDER CLEAN AIR ACT SECTIONS 108 AND 109

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I. EXECUTIVE SUMMARY

Congress enacted the Clean Air Act (CAA) to protect public health from diverse sources of air pollution, and empowered the Environmental Protection Agency (EPA) to establish regulations for different pollutants as scientific knowledge evolves, and the dangers they pose to human health and welfare become apparent. As this petition will establish, ambient ammonia pollution currently endangers human health and welfare, and EPA has an affirmative obligation to exercise its authority to regulate sources of ammonia emissions.

Ammonia gas, an air pollutant emitted in vast quantities by Concentrated Animal Feeding Operations (CAFOs), meets the criteria for listing as a CAA criteria pollutant, because ammonia emissions from numerous CAFOs and other sources "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare." CAA § 108. The predominantly rural nature of this pollution does not limit EPA"s authority to regulate; in fact, courts have made clear that even localized, site-specific, and infrequent ambient air pollution may create a public health risk that meets the § 108 standard and therefore warrants CAA regulation.

Several federal agencies, including EPA, have documented ammonia"s acute and chronic adverse health effects. Numerous peer-reviewed studies further demonstrate that ambient ammonia pollution in some rural communities near CAFOs currently exceeds recommended exposure levels, and citizens living near CAFOs experience adverse health effects from CAFO air pollution, including ammonia. Ammonia gas also reacts with other gases to form ammonium aerosols, inhalable small particles that further endanger public health.

This petition will also establish that ambient ammonia pollution endangers public welfare, which the CAA defines broadly to include quality of life, economic, aesthetic, and environmental values. Ammonia emissions detract from quality of life and decrease personal comfort and well-being in rural areas. Airborne ammonia re-deposits in and near waterways, adding nitrogen to ecosystems overloaded with nutrient pollution, reduces property values, and impairs visibility in scenic areas. The petitioners respectfully request that EPA issue a timely response to this petition, make an endangerment finding for ammonia, designate ammonia as a criteria pollutant, and establish primary and secondary National Ambient Air Quality Standards (NAAQS) to protect public health and welfare with an adequate margin of safety.

II. INTRODUCTION

The Environmental Integrity Project, Association of Irritated Residents, Caballo Concerned Citizens Group, Center for Food Safety, Citizens for Pennsylvania"s Future, Clean Wisconsin, Crawford Stewardship Project, Environmentally Concerned Citizens of South Central Michigan, Food & Water Watch, the Humane Society of the United States, Illinois Citizens for Clean Air and Water, Iowa Citizens for Community Improvement, Johns Hopkins Center for a Livable Future, Midwest Environmental Advocates, Northwest Environmental

Defense Center, Rio Valle Concerned Citizens, Sierra Club, Socially Responsible Agricultural Project, Sustain Rural Wisconsin Network, Vernon County Alliance Concerned with Environmental Safety, and Waterkeeper Alliance (petitioners) hereby petition the EPA to regulate air emissions of ammonia (NH_3) as a criteria pollutant under the CAA, sections 108 and 109.[1] Ammonia meets the legal standard for listing as a criteria pollutant because numerous stationary sources currently emit ammonia, an air pollutant, into the ambient air at levels which may reasonably be anticipated to endanger public health and welfare.

Ammonia qualifies as a pollutant that endangers public health and welfare. Exposure to airborne ammonia can cause both short-term and chronic respiratory health effects, and the chemical is lethal at sufficiently high concentrations. In addition, ammonia re-deposits onto soils and into sensitive waterways, resulting in soil acidification and eutrophication, which are destructive to both terrestrial and aquatic ecosystems. The small particles ammonia forms in combination with other pollutants contribute to regional haze and further threaten public health, and ammonia"s odor adversely affects quality of life and property values.

While ammonia sources that exceed certain thresholds must report emissions under federal "right to know" laws,[2] the CAA currently does not meaningfully regulate ammonia emissions from the nation"s most significant sources. The CAA, EPA"s most appropriate and effective tool for regulating air emissions, does not include ammonia on either its list of hazardous air pollutants, established in § 112, or its list of criteria pollutants, established pursuant to §§ 108 and 109; nor does it establish New Source Performance Standards under § 111 for CAFOs, the industry sector responsible for the majority of U.S. ammonia emissions.

The health and welfare harms caused by ambient ammonia warrant EPA"s increased scrutiny and regulation. Although additional CAA programs likely apply to ammonia and other CAFO emissions, EPA should regulate ammonia as a criteria pollutant, because short-term and chronic ambient ammonia pollution threatens public health and welfare in rural communities throughout the U.S. Due to ammonia"s toxicological profile and the human health and ecological threats it poses, the petitioners submit this petition to EPA, requesting that the agency list ammonia as a criteria pollutant and issue primary and secondary NAAQS to protect public health and public welfare from ammonia pollution.

[1] 42 U.S.C. §§7408, 7409.

[2] EPA recently limited these emissions reporting requirements as well. Under EPA"s 2008 CERCLA/EPCRA Administrative Reporting Exemption for CAFOs, only the Emergency Planning and Community Right to Know Act (EPCRA) still requires reporting of ammonia and hydrogen sulfide emissions from CAFOs, and only by large CAFOs as defined under the Clean Water Act. *See* CERCLA/EPCRA Administrative Reporting Exemption for Air Releases of Hazardous Substances From Animal Waste at Farms, 73 Fed. Reg. 76,948, 76,951 (Dec. 18, 2008).

III. PETITIONERS

The petitioners are the Environmental Integrity Project, Association of Irritated Residents, Caballo Concerned Citizens Group, Center for Food Safety, Citizens for Pennsylvania"s Future, Clean Wisconsin, Crawford Stewardship Project, Environmentally Concerned Citizens of South Central Michigan, Food & Water Watch, the Humane Society of the United States, Illinois Citizens for Clean Air and Water, Iowa Citizens for Community Improvement, Johns Hopkins Center for a Livable Future, Midwest Environmental Advocates, Northwest Environmental Defense Center, Rio Valle Concerned Citizens, Sierra Club, Socially Responsible Agricultural Project, Sustain Rural Wisconsin Network, Vernon County Alliance Concerned with Environmental Safety, and Waterkeeper Alliance.

The Environmental Integrity Project (EIP) is a nonpartisan, nonprofit organization established in March of 2002 by former EPA enforcement attorneys to advocate for more effective enforcement of environmental laws. CAFO pollution, one of EIP"s focal issues, contributes a controlling share of the total ammonia air emissions in the United States. EIP has an interest in protecting the environment from ammonia emissions released from CAFOs and other sources, as these emissions threaten human health and welfare, air quality, and water quality.

The Association of Irritated Residents (AIR) is an unincorporated non-profit with members throughout the San Joaquin Valley (SJV). On the basis of air quality issues, AIR has fought the local growth in dairy CAFOs in the SJV. For many years AIR has requested that the San Joaquin Valley Air Pollution Control District regulate ammonia as a precursor to $PM_{2.5}$ or ammonium nitrate. Wintertime $PM_{2.5}$ levels in Kern County, at the southern end of the SJV, are the worst in the nation.

Caballo Concerned Citizens Group (CCCG) is a grassroots community group of more than 1,000 New Mexicans. CCCG formed in response to a mega-dairy that attempted to locate in a region with shallow groundwater and vulnerable artesian wells, and within dangerous proximity to the Caballo Reservoir, the Rio Grande River, and pristine state parks. CCCG members living near animal factories cannot drink water from their wells or breathe the air in their homes due to these facilities" unregulated pollution, including ammonia.

Established in 1997, The Center for Food Safety (CFS) is a non-profit, membership organization that works to protect human health and the environment by curbing the proliferation of harmful food production technologies and by promoting organic and other forms of sustainable agriculture. CFS represents over 160,000 members throughout the country that are concerned about the impacts of factory farming on human health, animal welfare, and the environment. CFS believes that EPA must regulate ammonia and other pollutants from factory farms in order to protect human health and the environment and create a healthier, safer food supply.

Citizens for Pennsylvania's Future (PennFuture) works for a healthy environment, clean energy, and a sound economy. PennFuture litigates and advocates sound statewide policies to reduce air pollution from all sources, including agriculture.

Clean Wisconsin protects Wisconsin"s clean water and air and advocates for clean energy by being an effective voice in the state legislature and by holding elected officials and polluters accountable. Clean Wisconsin"s mission is to protect the special places that make Wisconsin such a wonderful place to live, work and play.

Crawford Stewardship Project is a grassroots community organization that works to protect the environment of Crawford County, Wisconsin from threats such as those posed by CAFOs and to promote sustainable land use, local control of natural resources, and environmental justice.

Environmentally Concerned Citizens of South Central Michigan (ECCSCM) supports vanguard, responsible agriculture, farming that looks ahead to the next generations, preserves biodiversity, raises animals in a healthy environment, does no harm to its neighbors, enhances the natural assets of living communities, and protects our natural resources – air, soils, groundwater, streams, and lakes. As family farmers and neighbors, ECCSCM believes agriculture must take responsibility for its actions in rural communities. CAFOs have failed us. They have damaged our farming communities, degraded our natural resources, and polluted our watersheds. ECCSCM believes that ammonia must be regulated to protect our communities, young and old.

Food & Water Watch is a national nonprofit advocacy organization that advocates for common sense policies that will result in healthy, safe food and access to safe and affordable drinking water. The issue of industrialized livestock production is a core part of Food & Water Watch"s work. Food & Water Watch has worked since 2005 to change federal and state policy on CAFOs and also works to educate the public on the variety of impacts these facilities have on public health and the environment.

The Humane Society of the United States (HSUS) is a national and international non-profit charitable organization that works to reduce suffering and improve the lives of all animals. The HSUS maintains its headquarters in Washington, D.C., and has offices, affiliates, or staff in 25 states, the District of Columbia, and five foreign countries. Through its policy, legislative, litigation, and grass-roots activities, the HSUS has become the nation"s largest and most effective animal protection organization, with more than 11 million members and constituents. The HSUS actively advocates against practices that harm all animals, including practices that result in unhealthy levels of pollutants being discharged into farm animal and wildlife habitats. HSUS has actively campaigned to regulate air pollutants being discharged by CAFOs through efforts with the EPA, in Congress, and in the Courts. Members of HSUS in the Lathrop, California community teamed up with the HSUS to bring a suit against a large chicken CAFO

that emits toxic levels of ammonia into their neighborhood and HSUS has petitioned the EPA to list and regulate CAFOs under the Clean Air Act. In the course of HSUS cases, experts have documented ambient ammonia levels above recommended health limits in the local community.

Illinois Citizens for Clean Air and Water (ICCAW) is a state-wide coalition of family farmers and community groups advocating for sound policies and practices that protect the environment, human health, and rural quality of life from the impacts of large-scale, industrialized livestock production facilities in Illinois. A majority of its members are family farmers and rural residents that live near large-scale livestock facilities that have been adversely impacted by the problems they create. The regulation of ammonia emissions from CAFOs is of particular concern to ICCAW because of the human health risks neighbors experience from exposure.

Iowa Citizens for Community Improvement (Iowa CCI) is a 36-year-old statewide non-profit grassroots organization. Iowa CCI has led the fight against factory farms in Iowa for the past 15 years and has pushed for better environmental and permitting laws for factory farms on the state and national level – including the first clean air standards established for ammonia and hydrogen sulfide in the state of Iowa.

The Johns Hopkins Center for a Livable Future, based at the Bloomberg School of Public Health, conducts and funds research that increases knowledge about the complex interactions among diet, health, food production and the natural environment. The Center has over a decade of experience researching the public health impacts of industrial food animal production. Research has provided strong evidence that the complex mixtures of AFO air pollutants impact health of surrounding communities. The release of ammonia from these facilities and from land applied animal waste contributes to population exposures. Given this, there is strong justification for EPA to add ammonia as a criteria pollutant and develop ambient standards aimed at protecting public health.

Midwest Environmental Advocates (MEA) is a non-profit environmental law center, founded in 1999, which provides legal services for the under-represented and advocates for the public‟s right to clean air, land and water. MEA represents communities negatively affected by air and water pollution, including ammonia pollution, from CAFOs. MEA‟s clients have experienced many of the health impacts associated with ammonia including respiratory problems, dizziness, nausea, and burning eyes.

The Northwest Environmental Defense Center (NEDC) is an independent, nonprofit organization working to protect the environment and natural resources of the Pacific Northwest. NEDC has an interest in protecting the region‟s air quality and water quality from CAFO ammonia pollution. For example, NEDC has worked to protect the environment of the Columbia River Gorge, where ammonia emissions from CAFOs have contributed to haze.

Rio Valle Concerned Citizens (RVCC) is a community group organized by citizens in 2010, and is part of a New Mexico Dairy Coalition that works to protect the state‟s groundwater from dairy pollution. As a community living near a CAFO, RVCC has an interest in bringing ammonia pollution down to a safe level. RVCC believes that CAFOs should monitor the amount of ammonia they emit and the health effects our community residents are living with because of ammonia pollution, and be responsible for reducing ammonia pollution to a safe level.

Since 1892, the Sierra Club has been working to protect communities, wild places and the planet. With 1.4 million members and supporters, it is the largest grassroots environmental organization in the United States. The Sierra Club has long been involved in public education, advocacy and litigation to reduce pollution from CAFOs.

Socially Responsible Agricultural Project (SRAP) is a unique organization dedicated to assisting rural communities facing economic strife to help them discover local solutions which will help them thrive once again. Established in 1997, this nonprofit organization has assisted over 750 communities and groups in the United States and Canada that have been impacted by the negative effects of industrial agriculture.

Sustain Rural Wisconsin Network (SRWN) is a statewide coalition of organizations and individuals working together to understand and influence impacts of CAFOs on rural Wisconsin communities. SRWN supports actions to promote environmentally sound, socially responsible farming practices that assure clean air and water and safe local food production for the future. SRWN also works to encourage the diversity and vitality of Wisconsin‟s rural family farms and communities.

Vernon County Alliance Concerned with Environmental Safety (ACES) successfully organized to protect its community from a 3,200 head factory dairy proposed by an out-of-state developer. ACES‟ mission is to ensure that the environment, economy, and health are preserved and protected in the design and location of business and industry in Vernon County, Wisconsin.

Waterkeeper Alliance is an international nonprofit organization representing the interests of its nearly 200 member watershed groups. Waterkeeper, along with each of its member groups, is dedicated to the preservation and protection of waterbodies and their neighboring communities. Aligned with this mission, Waterkeeper is concerned with the impacts of concentrated animal production on public health and the environment, and it seeks to reduce these impacts by actively advocating for the control of animal waste pollution, and for the promotion of sustainable agriculture.

IV. LEGAL AUTHORITY FOR REGULATING AMMONIA

The CAA provides EPA with the legal authority required to regulate ammonia. Congress directed EPA to designate pollutants that endanger public health or welfare as criteria pollutants, and to establish protective primary and secondary National Ambient Air Quality Standards for these pollutants, under §§ 108 and 109 of the CAA.

Section 108 sets out the requirements for establishing and regulating criteria pollutants:

> (a) Air Pollutant List; publication and revision by Administrator; issuance of air quality criteria for air pollutants
> (1) For the purpose of establishing national primary and secondary ambient air quality standards, the Administrator shall within 30 days after December 31, 1970, publish, and shall from time to time thereafter revise, a list which includes each air pollutant---
> (A) emissions of which, in his judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare;
> (B) the presence of which in the ambient air results from numerous or diverse mobile or stationary sources; and
> (C) for which air quality criteria had not been issued before December 31, 1970, but for which he plans to issue air quality criteria under this section.

This petition will demonstrate that ammonia meets all of the CAA statutory requirements for regulation under § 108 because: 1) it is a pollutant, 2) emissions of which may reasonably be anticipated to endanger public health and welfare, 3) the presence of which results from numerous stationary sources (primarily CAFOs), and 4) for which no air quality criteria have been issued.

Once EPA lists a pollutant under § 108, the listing triggers § 109, which sets the schedule for promulgating NAAQS[3] and requires EPA to establish primary and secondary standards sufficient to protect public health and welfare. EPA has only designated six criteria pollutants: 1) carbon monoxide, 2) nitrogen dioxide, 3) ozone, 4) lead, 5) sulfur dioxide, and 6) particulate matter (both $PM_{2.5}$ and PM_{10}). However, the wording of § 109(d), which requires EPA to review the NAAQS every five years and "promulgate such new standards as may be appropriate in accordance with section 7408 [108]," makes clear that Congress anticipated the list should evolve as new scientific studies emerge and new pollutants qualify for listing. Furthermore,

[3] Section 109 states "[n]ot later than December 31, 1980, and at five-year intervals thereafter, the Administrator shall complete a thorough review of the criteria published under section 7408 of this title and the national ambient air quality standards promulgated under this section and shall make such revisions in such criteria and standards and promulgate such new standards as may be appropriate in accordance with section 7408 of this title and subsection (b) of this section. The Administrator may review and revise criteria or promulgate new standards earlier or more frequently than required under this paragraph." CAA § 109(d)(1).

courts have established that § 109(d) gives rise to a mandatory duty for EPA to regulate a pollutant once it satisfies the statutory requirements of § 108.[4]

Under §109(d), the Administrator and independent scientific review committee must re-evaluate both the list of criteria pollutants and the NAAQS in five-year intervals, but may promulgate new standards more frequently in its discretion. Due to ammonia's ongoing adverse effects on public health and welfare, the petitioners urge EPA to take prompt action in response to this petition.

V. EPA SHOULD REGULATE AMMONIA AS A CRITERIA POLLUTANT UNDER CAA SECTION 108

EPA should make an endangerment finding and designate ammonia as a criteria pollutant, because it meets the statutory requirements for regulation. Ammonia is a pollutant, emissions of which endanger public health and welfare, the presence of which results from numerous stationary sources (CAFOs), and for which no air quality criteria have been issued.

A. Ammonia meets the CAA definition of an air pollutant

CAA section 108(a)(1) only applies to the regulation of air pollutants. Ammonia clearly meets the CAA § 302(g) definition of an air pollutant: "any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive (including source material, special nuclear material, and byproduct material) substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term „air pollutant" is used."

The term "air pollutant" has been given a broad and "sweeping" interpretation by the Supreme Court.[5] Ammonia gas meets the CAA's definition because, as this petition will establish, it causes harm to public health and the natural environment when numerous stationary sources, including CAFOs, steel mills, and refineries, emit it into the ambient air. EPA currently regulates airborne ammonia under CERCLA as a hazardous substance, and under EPCRA as an extremely hazardous substance,[6] and the Agency for Toxic Substances and Disease Registry (ATSDR) characterizes ammonia as a toxin because exposure to airborne ammonia can result in severe respiratory effects. EPA also recognizes ammonia's role as a fine particulate matter

[4] *See* discussion *infra* Section VIII.

[5] *Massachusetts v. EPA*, 549 U.S. 497 (2007) at 527. The court places emphasis on the use of the word "any" air pollutant.

[6] 40 C.F.R. §§ 302.4–302.5, 355.40, App. A to § 355 (2008).

precursor pollutant.[7] Thus ambient ammonia gas is air pollution, and ammonia emitted into the air is an air pollutant under the CAA.

B. Ammonia emissions cause and contribute to air pollution which may reasonably be anticipated to endanger both public health and welfare

Under CAA § 108(a)(1)(A), to qualify as a criteria pollutant, ammonia must cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. This petition presents extensive evidence to support a finding that ammonia endangers both public health and public welfare, and that ammonia emissions from numerous stationary sources currently give rise to ambient ammonia concentrations harmful to human health and quality of life, soil and water quality, visibility, and property values.

1. Ammonia emissions endanger public health

The CAA requires EPA to establish NAAQS for an air pollutant if the agency determines that the pollutant can be reasonably anticipated to endanger public health. Although the CAA and its implementing regulations do not define public health, the Supreme Court has affirmed its broad and common sense meaning, declaring it as simply "the health of the public."[8] The World Health Organization has also established a widely accepted definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[9] In addition, Black"s Law Dictionary (8th ed. 2004) defines both health: it defines health – "the state of being sound or whole in body, mind, or soul" and "freedom from pain or sickness" – and public health – "the health of the community at large."

Ammonia pollution threatens public health in numerous ways encompassed by these broad definitions. Threats to public health from ambient ammonia include increased risk of respiratory symptoms, eye and nose irritation, and other physical discomfort, as well as more severe health effects. Ammonia also contributes to the health effects of the mixture of gases in CAFO air emissions, which studies have linked to respiratory symptoms as well as headaches, nausea, and increased incidence of infant mortality. If certain communities face a disproportionate and substantial risk of adverse health effects from airborne ammonia, EPA may – and should – find that ammonia warrants regulation as a criteria pollutant. Extensive research conducted on both human and animal subjects over several decades establishes that ammonia emissions endanger human health. Indeed, several federal agencies, including EPA, have recognized this threat by establishing health standards or recommended exposure limits to protect workers and others exposed to airborne ammonia. CAFO emissions research further shows that airborne ammonia levels in some communities currently exceed relevant health benchmarks, demonstrating that ammonia is reasonably anticipated to endanger public health.

[7] *See* discussion *infra* Section V.B.1.iii.e.
[8] *Whitman v. American Trucking Ass'n*, 531 US 457, 466 (2001).
[9] World Health Organization (1948), http://www.who.int/about/definition/en/print.html.

i. EPA should regulate ammonia under the CAA because ammonia exposure causes significant adverse health effects

Ammonia"s health effects have been thoroughly documented by the ATSDR, part of the Department of Health and Human Services, as well as the National Academy of Sciences, universities, and other federal agencies. ATSDR assessed "all relevant [ammonia] toxicologic testing and information that has been peer-reviewed" in drafting its Toxicological Profile for Ammonia.[10] EPA employs a similarly thorough review of ammonia health research, the National Academy of Sciences" Acute Exposure Guideline Levels (AEGL) report for ammonia.[11] The National Advisory Committee established to draft this report was tasked to "identify, review, and interpret relevant toxicologic and other scientific data" and establish acute exposure guidelines for ammonia and other "high-priority, acutely toxic chemicals."[12] Two Iowa universities have also compiled significant published research on the human health effects of ammonia gas exposure, which they reported in the 2002 Iowa CAFO Air Quality Study.[13] These three peer-reviewed documents compile and evaluate decades of accidental ammonia exposure case studies as well as human and animal irritation, exposure, and lethality studies.[14]

Depending on the concentration, duration of exposure, and sensitivity of the individual exposed, ammonia exposure causes a range of effects including odor detection, nasal, throat, and eye irritation, burns, scarring, and even death. The AEGL report for ammonia summarizes existing acute exposure research in the following chart.[15]

[10] ATSDR, *supra* note 6.
[11] Acute Exposure Guideline Levels for Selected Airborne Chemicals, Vol. 6, Committee on Acute Exposure Guideline Levels, Committee on Toxicology, Nat"l Research Council of the National Academies of Sciences, *available at* http://www.epa.gov/oppt/aegl/pubs/ammonia_final_volume6_2007.pdf [hereinafter Ammonia AEGL Report].
[12] Ammonia AEGL Report at 4.
[13] IOWA STATE UNIV. & UNIV. OF IOWA STUDY GROUP, IOWA CONCENTRATED ANIMAL FEEDING OPERATIONS AIR QUALITY STUDY (2002) at 123 [hereinafter Iowa Study], *available at* http://www.public-health.uiowa.edu/ehsrc/CAFOstudy.htm. *See also* discussion of Iowa Study *infra* Section V.B.1.ii.d.
[14] ATSDR at 102; Ammonia AEGL Report at 59; Iowa Study at 123-24.
[15] Excerpted from Ammonia AEGL Report, Table 2-5, at 77-78.

SUMMARY OF NONDISABLING AND REVERSIBLE EFFECTS OF INHALED AMMONIA IN HUMANS		
Concentration	**Duration of Exposure**	**Effect**
5 ppm	3 hours, with rest and exercise for 1.5 hours each	Subjective rating of eye discomfort and smell, headache, dizziness, and "feeling of intoxication" significantly greater than of controls; sensory adaptation to odor; no exposure-related change in pulmonary function, increase in nasal cells, no increase in exhaled NO, and no alteration in bronchial response to methacholine.
25 ppm	3 hours, with rest and exercise for 1.5 hours each	Subjective rating of eye, upper respiratory, and throat irritation, smell, headache, dizziness, and "feeling of intoxication" significantly greater than of controls; no sensory. Adaptation to odor; no exposure-related change in pulmonary function, increase in nasal cells, no increase in inhaled NO, and no alteration in bronchial response to methacholine.
30 ppm	10 minutes	Odor was moderately intense to highly penetration; irritation was faint or not detectable.
32 ppm	5 minutes	Nasal Dryness.
50 ppm	5 minutes	Nasal Dryness.
50 ppm	10 minutes	Highly penetrating odor; moderate irritation.
50 ppm	30 minutes	Moderately intense odor; moderate irritation to eyes and nose; mild irritation to throat and chest; slight urge to cough; slight general discomfort.
50 ppm	1 hour	Highly intense odor; moderate irritation to eyes, nose, throat, and chest; mild urge to cough; slight general discomfort.
50 ppm	2 hours	Offensive odor; moderate irritation to eyes, nose, throat, and chest, mild urge to cough; mild general discomfort.
72 ppm	5 minutes	Nasal, eye, and throat irritation.
80 ppm	30 minutes	Highly intense odor; highly intense eye and nose irritation; moderate throat and chest irritation; mild urge to cough; moderate general discomfort.
80 ppm	1 hour	Highly intense odor; moderate eye, nose, throat, and chest irritation; mild urge to cough; moderate general discomfort.

80 ppm	2 hours	Highly intense odor; highly intense eye, nose, throat, and chest irritation; highly intense urge to cough; and moderate general discomfort.
100 ppm	5-30 seconds	Significant increase in nasal airway resistance, but atopic subjects, including asthmatics, responded similarly to the nonatopic subjects.
100 ppm	2-6 hours/day, 5 weeks	No adverse effects on respiratory function and no increase in frequency of eye, nose, or throat irritation.
110 ppm	30 minutes	Highly intense odor, highly intense eye, nose throat, and chest irritation, mild urge to cough; moderate general discomfort.
110 ppm	1 hour	Highly intense odor; highly intense eye, nose, throat, and chest irritation; moderate urge to cough, moderate general discomfort
110 ppm	2 hours	Highly intense odor; highly intense eye and nose irritation; urge to cough; general discomfort
140 ppm	30 minutes	Highly intense odor; unbearable eye, nose, throat, and chest irritation; mild urge to cough; moderate general discomfort.
140 ppm	1 hour	Highly intense odor; unbearable eye, nose, throat, and chest irritation; moderate urge to cough; moderate general discomfort.
140 ppm	2 hours	Highly intense odor; unbearable eye and nose irritation; highly intense throat and chest irritation; highly intense urge to cough; unbearable general discomfort
143 ppm	5 minutes	Nose, eye, throat, and chest irritation; lacrimation.
500 ppm	15-30 minutes	Nose and throat irritation; nasal dryness and stuffiness; excess lacrimation; hyperventilation; unbearable.
570 ppm	Single Breath	Threshold for reflex glottis closure, 21 to 30-year-old subjects.
1000 ppm	Single Breath	Threshold for reflex glottis closure, 60-year-old subjects.
1000 ppm	NR	Immediate urge to cough.
1790 ppm	Single Breath	Threshold for reflex glottis closure, 86 to 90-year-old subjects.

Humans detect ammonia odor at concentrations ranging from 5 to 53 parts per million (ppm), and the odor can become "highly penetrating" at 50 ppm after 10 minutes of exposure.[16] One third of the volunteers in one human exposure study experienced irritation after just 10 minutes of exposure to 30 ppm ammonia.[17] The same study showed that eye, nose, throat, and chest irritation become moderate after a 30-minute exposure to 50 ppm and can become "highly intense" after a 30-minute exposure to 80 ppm.[18] At concentrations of 50 ppm, ammonia exposure can lead to throat irritation, mucous production, and cough.[19] At heightened concentrations, ammonia's effects exceed odor and irritation, and cause actual damage to the respiratory system. This damage may include tracheal and nasopharyngeal burns, and bronchiolar/alveolar swelling.[20]

Non-fatal effects of acute exposures to high concentrations of ammonia can be long-lasting, and even permanent. One case study considered in ATSDR's Toxicological Profile monitored the health effects on three men who had been acutely exposed to ammonia gas; the men subsequently reported several symptoms, including burning of the skin, eyes, and throat.[21] The men also showed signs of stressed airways as evidenced by wheezing and cough. More than two years later, the researchers re-evaluated the men and found continuing symptoms of restrictive lung disease.[22] Another case study considered by ATSDR followed a man who, 12 years after exposure to ammonia gas, still suffered from recurrent bronchial infections as well as cough and exertional dyspnea, or shortness of breath while exercising.[23]

The Toxicological Profile also documents accidents involving exposure to ammonia that resulted in neurological impacts such as blurred vision, muscle weakness, decreased deep tendon reflexes, and loss of consciousness.[24] Due to ammonia's solubility in water, ocular effects such as inflammation of the eyes and swelling of the eye-lids can occur with exposure to airborne ammonia.[25] Ammonia's solubility also allows it to quickly absorb into the upper airways, where it can damage the epithelial cells.[26]

In addition, ammonia inhalation can cause fatal burns and infections.[27] According to ATSDR, ammonia becomes acutely lethal at concentrations of 5,000-10,000 ppm.[28] These levels

[16] Ammonia AEGL Report at 59-60.
[17] *Id.* at 60.
[18] *Id*.
[19] *Id*. *See also* Iowa Study at 123.
[20] ATSDR at 16.
[21] *Id*. at 48.
[22] *Id*.
[23] *Id*.
[24] *Id*. at 55.
[25] *Id*. at 73.
[26] Iowa Study at 123.
[27] ATSDR at 25.
[28] *Id*.

of exposure often result in chemical burns and swelling of the skin, eyes, and respiratory tract.[29] At such high levels, studies have found that the ammonia actually scorches those exposed from the inside out, causing extensive internal damage such as swelling and congestion of the lungs, the stripping off of the epithelial lining of the bronchial wall, and ammonia burns across the upper body, face, and mouth.[30]

Ammonia"s health impacts persist even as it undergoes chemical transformations in the ambient air. Once in the air ammonia reacts to form ammonium aerosols;[31] both ammonia and these aerosol particles can have devastating effects on cardiovascular and hematological systems. Various non-human studies show that exposure to high concentrations of these compounds can cause high blood pressure, elevated pulse, bradycardia,[32] and even cardiac arrest.[33]

Specific health effects of acute ammonia exposure incidents depend on several factors, but these ammonia inhalation and exposure studies and literature reviews together document a scientifically accepted correlation between exposure to airborne ammonia and adverse respiratory and other health effects. These studies also consistently report odor, irritation, cough, and other respiratory symptoms for some individuals exposed to ammonia concentrations of approximately 30 ppm even over short periods of time.

Research further indicates that which symptoms a person experiences and which parts of the respiratory tract are affected depend not only on the concentration of ammonia, but also on whether exposure is acute or chronic. Acute exposures to low levels of ammonia affect the upper respiratory tract, whereas exposure to higher concentrations over longer periods of time affect both the upper and lower respiratory tracts and the alveolar capillaries in the lungs.[34] At sufficiently high concentrations, ammonia will bypass the upper airways and directly affect the lungs, causing inflammation of the lower lungs and pulmonary edema, or swelling.[35]

Although less research exists documenting the health effects of chronic ammonia exposures than of acute exposures, ATSDR based its long-term exposure recommendation on a 12-year case study of occupational exposure, from which the agency derived a no observable adverse effect level (NOAEL) of 9.2 ppm.[36] This petition will discuss additional studies of health and welfare effects from long-term ammonia exposure near CAFOs.

In short, ammonia released into the air causes both acute health effects and chronic diseases. However, though ammonia may be reasonably anticipated to endanger public health, EPA currently does not regulate airborne ammonia to protect the health of the general public.

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[29] *Id*.
[30] *Id*.
[31] *Id*. at 34.
[32] Slow heart beat; *see* Mayo Clinic, Bradycardia at http://www.mayoclinic.com/health/bradycardia/ds00947.
[33] ATSDR at 52.
[34] *Id*.
[35] Iowa Study at 123.
[36] *Id*. at 40.

The only enforceable ammonia standards currently in effect apply exclusively to workers; but as this petition will establish, non-workers near CAFOs and other ammonia sources also require protection from unsafe ambient levels of ammonia. The NAAQS program provides the best mechanism for this protection.

ii. Ammonia is widely recognized as a health threat

Based on ammonia"s well-documented and life-threatening health effects, EPA, ATSDR, the Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health (NIOSH) have taken steps to protect workers from dangerous exposures to ammonia and inform the public of the potential risks of exposure. Moreover, groups of experts have considered the health effects of ammonia from CAFOs in particular, and have recommended that EPA regulate ammonia under the CAA based on existing research. This section introduces several relevant health benchmarks, and discusses the merits and limitations of each with regard to assessing the health risk of ambient ammonia. It then discusses the Iowa Study of CAFO emissions and the Pew Commission report on industrial livestock production and their recommendations to protect communities from the health effects of ambient ammonia. This petition will analyze several studies of ammonia emissions from CAFOs, using these various existing and proposed health thresholds as indicators for the risk posed by current ammonia levels at the CAFO vent and in the ambient air.

a. Acute Exposures: EPA's Acute Exposure Guideline Levels

EPA has already adopted both short- and long-term ammonia heath guidelines. The first is a system of short-term pollution exposure limits, known as Acute Exposure Guideline Levels (AEGLs), established to guide response actions when people experience a rare – even "once-in-a-lifetime" – short-term, accidental exposure to a toxic chemical.[37] The National Advisory Committee reviewed relevant studies and data, then used these studies to establish threshold exposure limits "below which adverse health effects are not likely to occur."[38]

EPA divides the AEGLs into three levels: AEGL-1, the concentration above which the public, including susceptible individuals, could experience irritation or discomfort but no lasting effects; AEGL-2, the concentration above which the general public, including susceptible individuals, could experience permanent, serious adverse health effects and an inability to escape from the chemical threat; and AEGL-3, the concentration above which the general public, including susceptible individuals, could experience life-threatening adverse health effects or death.[39] EPA established several AEGL concentrations for each level, correlated with different exposure durations. The AEGL-1 for each of several acute-duration exposure times is 30 ppm,

[37] EPA, Acute Exposure Guideline Level Program, http://www.epa.gov/oppt/aegl/index.htm (last visited Mar. 18, 2011).
[38] Ammonia AEGL Report at 4.
[39] *Id*. at 4-5.

indicating that after as few as ten minutes, individuals may experience temporary, but adverse, health effects from breathing 30 ppm ammonia.[40] The following chart shows EPA's AEGLs for ammonia.[41]

Ammonia 7664-41-7 (Final)					
ppm					
	10 min	30 min	60 min	4 hr	8 hr
AEGL 1	30	30	30	30	30
AEGL 2	220	220	160	110	110
AEGL 3	2,700	1,600	1,100	550	390

The AEGLs provide one of the most comprehensive and scientifically rigorous reviews of existing human and animal research on the effects of ammonia exposure. Moreover, these guidelines consider the health effects on high-risk populations, rather than considering only effects on worker health as some other agency standards do. The AEGLs also demonstrate that EPA already recognizes ammonia's short-term health effects, even at moderate concentrations. Consequently, these guidelines provide a strong foundation from which EPA can establish short-term NAAQS that will protect public health and welfare from short-term elevations in ambient ammonia levels from sources such as CAFOs.

Although the AEGLs provide EPA with a comprehensive review of scientific research with which to regulate, ammonia NAAQS must be more protective than the AEGLs. These levels are set to protect the public from a *once-in-a-lifetime* exposure to ammonia, while many rural citizens breathe elevated CAFO ammonia emissions for varying time periods on a frequent basis for years, or even decades. Thus, while the AEGLs provide a useful starting point for CAA regulation, they do not provide adequate ambient air quality standards.

b. Ambient Exposures: EPA's Reference Concentration and ATSDR's Minimal Risk Levels

EPA has also considered and assessed the chronic effects of ammonia inhalation, and established a Reference Concentration (RfC) of 0.14 ppm to indicate a safe level of ammonia to breathe over the long term. EPA derived the RfC from the results of a long-term worker exposure study, which it then adjusted with uncertainty factors to better protect sensitive individuals and account for the lack of a robust data set.[42] This chronic exposure RfC provides a useful starting point for EPA to use in establishing a one-year or other long-term ambient standard that will protect public health from continuous low-level ammonia emissions.

[40] EPA, Acute Exposure Guideline Levels Ammonia Results, http://www.epa.gov/oppt/aegl/pubs/results88.htm (last visited Mar. 18, 2011).
[41] *Id*.
[42] ATSDR at 163.

As discussed above, ATSDR has also reviewed existing research on the effects of ammonia exposure on both humans and animals and has established health thresholds called Minimal Risk Levels (MRLs) for both acute and chronic inhalation exposure to ammonia.[43] Much like EPA's RfC, in determining MRLs for different substances, ATSDR considered the most susceptible individual and estimated "the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure."[44] Thus, ATSDR established the MRLs to identify the level above which daily exposure to airborne ammonia, in the absence of other pollutants, poses a health risk.

Based on its review of all available ammonia exposure research, ATSDR set its acute MRL for ammonia at 1.7 ppm for inhalation exposure of 14 days or fewer,[45] and set the chronic MRL at 0.1 ppm for inhalation exposure of 365 days or more.[46] Both threshold MRLs provide relevant points of reference when determining whether a specific ambient ammonia concentration could create a public health hazard. As this petition will discuss, studies provide evidence that citizens may be exposed to ammonia levels that exceed the MRLs in areas near even a single large CAFO. Moreover, ATSDR has observed respiratory health impacts from a single livestock facility work shift exposure to 7.9 ppm ammonia, but to isolate the effects of ammonia ATSDR specifically excluded this research when establishing the MRLs.[47] EPA should instead account for the increased health effects from mixed-pollutant exposures when considering safe ambient ammonia levels.

Some of the studies referenced in this petition, such as the Iowa Study discussed below, use the ATSDR's old chronic MRL of 0.3 ppm as the relevant ambient health threshold. As a result they may not conclude that observed ambient ammonia levels above 0.1 ppm pose a health threat. However, in 2004 ATSDR acknowledged that the study on which it had based the prior chronic MRL did not adequately represent all vulnerable populations and could not account for the lack of developmental and reproductive studies. To take this data gap into account, ATSDR used a modifying factor of three and adopted the current 0.1 ppm chronic MRL.[48] Thus, EPA should re-examine research conclusions based on the under-protective past MRL, with the new MRL in mind.

Between its own and ATSDR's established health thresholds, EPA already has much of the research necessary to establish protective NAAQS for acute, intermediate, and long-term ammonia exposure. However, research focused on CAFO emissions – the source of the majority of ammonia emissions in the U.S, but also a source of hydrogen sulfide, particulates, and hundreds of volatile organic compounds – indicates that adequately protective standards must

[43] ATSDR at 18-20.
[44] ATSDR, Minimal Risk Levels (MRLs) for Hazardous Substances, http://www.atsdr.cdc.gov/mrls/index.html (last visited Mar. 18, 2011).
[45] *Id*.
[46] *Id*. at 19.
[47] *Id*. at 18.
[48] *Id*. at 20.

also account for the additive or synergistic adverse health effects of multiple-pollutant exposures. EPA should consider multiple-pollutant effects when deciding whether and how to regulate ammonia under the CAA.

c. Worker Exposures: NIOSH's Recommended Exposure Limits and OSHA's Permissible Exposure Limit

The NIOSH, part of the Centers for Disease Control and Prevention, has established recommended exposure limits (RELs) for workers breathing ammonia pollution in the workplace. Similarly, OSHA has established a health standard for ammonia in the workplace. NIOSH recommends that employers should not expose workers to more than 25 ppm of ammonia averaged over a ten-hour period or 35 ppm averaged over a 15-minute period.[49] OSHA permissible exposure limits (PELs) are similar to NIOSH recommendations in that they are meant to protect workers. However, in the case of ammonia OSHA adopted a less stringent benchmark; its enforceable ammonia standard limits worker exposure to a maximum ammonia concentration of 50 ppm, averaged over an 8-hour time period.

NIOSH and OSHA based these exposure levels, unchanged since 1974, on a NIOSH literature review that included both human and animal ammonia exposure studies that were primarily conducted between the 1940s and mid-1960s.[50] This criteria document noted that at the time of publication, few or no studies on agricultural ammonia exposure existed.[51] When compared to ATSDR"s and the National Academy of Sciences" findings of health effects at low exposure levels, it becomes clear that NIOSH did not seek to avoid all adverse health impacts or ammonia irritation when recommending occupational exposure standards. Rather, the report sought to identify "exposure levels at which no employee will suffer impaired health or functional capacities or diminished life expectancy as a result of his work experience."[52] OSHA is not required to provide workers protection equal to that EPA must provide the public through its CAA authority.

The agencies recognized in 1989 that the OSHA PEL for ammonia did not adequately protect worker health and sought to adopt a more stringent PEL. The amended standard would have set a 15-minute short-term exposure level of 35 ppm through a "generic" rulemaking that covered more than 400 hazardous chemicals. However, the 11th Circuit vacated this rule on procedural grounds unrelated to the need for a more protective ammonia standard, holding that OSHA had failed to adequately support and explain each new standard in its record.[53] OSHA has not acted to strengthen the ammonia PEL since its rule was vacated. Thus, even OSHA has

[49] NIOSH, Pocket Guide to Chemical Hazards, http://www.cdc.gov/niosh/npg/npgd0028.html (last visited Mar. 18, 2011).
[50] *Criteria for a Recommended Standard…Occupational Exposure to Ammonia*, HEW Publication No. (NIOSH) 74-136 (1974), *available at* http://www.cdc.gov/niosh/74-136.html (last visited Mar. 18, 2011).
[51] *Id*. at 60-62.
[52] *Id*. at 22.
[53] *See AFL-CIO v. OSHA*, 965 F.2d 962 (11th Cir., 1992).

recognized that ammonia creates a greater threat to worker health and safety than its current PEL reflects.

Though some of these health benchmarks are under-protective and were never intended to protect the general population from ammonia exposure, and none take multiple pollutant exposures into account,[54] each can help EPA interpret existing data on ammonia air emissions from stationary sources such as CAFOs and establish safe ambient standards for airborne ammonia. Because ATSDR and EPA's health thresholds address health threats to the general public from both acute and chronic ammonia exposure, they serve best to analyze monitoring of ambient air near residences and public places. Conversely, because the NIOSH and OSHA exposure levels address health threats over shorter periods of time and with only workers in mind, they can provide a frame of reference for monitoring data collected at the source, such as CAFO vents, but have little value in assessing the public health threat posed by ambient ammonia.

d. Iowa's Joint University CAFO Air Quality Study

At the request of then-Iowa Governor and current U.S. Secretary of Agriculture Tom Vilsack, Iowa State University and the University of Iowa completed a significant joint report (the Iowa Study) on air emissions from CAFOs in 2002.[55] The Iowa Study reviewed and analyzed peer-reviewed studies on various aspects of these emissions, including the volume and nature of CAFO air emissions, the toxicology of pollutants released from CAFOs, and the community health and social impacts of CAFO emissions. The state tasked the study group with answering specific questions about CAFO air emissions; among them, the study set out to answer: "[b]ased on an analysis of peer-reviewed, duplicated, legitimate, and published scientific research, what would you recommend as Iowa or National consensus standards for any proposed substances to be regulated as emissions from CFOs?"[56]

The Study's authors answered this question with a significant recommendation; based on their review of credible CAFO emissions research, they concluded that EPA should regulate certain substances released from CAFOs – namely ammonia, hydrogen sulfide, and odor – under the CAA NAAQS program.[57] Based on this emissions research, as well as state ammonia standards, ATSDR and EPA recommendations, and research on the additive or synergistic effects of multiple pollutants in CAFO emissions, the Study recommends that protective

[54] Regardless whether EPA has considered additive effects of multiple-pollutant exposures in establishing NAAQS for criteria pollutants to date, the CAA requires EPA to list criteria pollutants if they "cause *or contribute to*" pollution that may endanger public health. CAA § 108(a)(1)(A). Thus EPA should consider the health effect of CAFO emissions as a whole when determining a safe level of ambient ammonia exposure.
[55] IOWA STATE UNIV. & UNIV. OF IOWA STUDY GROUP, IOWA CONCENTRATED ANIMAL FEEDING OPERATIONS AIR QUALITY STUDY (2002) at 123 [hereinafter Iowa Study], *available at* http://www.public-health.uiowa.edu/ehsrc/CAFOstudy.htm (last visited Mar. 18, 2011).
[56] Iowa Study at 8. The study uses the Iowa regulatory term "CFO" interchangeably with CAFO. *Id*. at 5.
[57] *Id*. at 8.

ammonia one-hour averages should not exceed 500 ppb (0.5 ppm) at the CAFO property line or 150 ppb (0.15 ppm) in residential and public use areas.[58]

While this ambient level very nearly matches EPA's RfC for ammonia, the Study recommends 0.15 ppm as a one-hour average limit, rather than a long-term limit, due to the complex effects of breathing numerous pollutants simultaneously. Thus, as a result of studying CAFO emissions specifically, and not simply examining ammonia gas in isolation, the Iowa Study emphasized the most typical route for ambient ammonia exposure and its researchers proposed a far more protective standard than any federal agency to date. EPA should consider the Iowa Study's peer-reviewed recommendations and findings when reviewing this petition.

e. Pew Commission Report on Industrial Farm Animal Production

In 2008, the Pew Commission on Industrial Farm Animal Production (PCIFAP), an independent project of Johns Hopkins Bloomberg School of Public Health and the Pew Charitable Trusts, released a similarly comprehensive report on the impacts of industrial livestock production. This report – "Putting Meat on the Table: Industrial Farm Animal Production in America" [59] (the Pew Commission Report) – compiled the published literature on a wide range of CAFO impacts, including air emissions and their effects on public health.

Among its recommendations, the Pew Commission Report concluded that "EPA should develop a standardized approach for regulating air pollution" from CAFOs under the CAA.[60] The Report also noted the complicated effects of mixed air pollutants found in CAFO emissions and the importance of considering these mixed exposures.[61] The Pew Commission Report analyzed the most current and comprehensive CAFO emissions and health research from across the globe, and EPA should consider its findings and recommendations when reviewing this petition.

The Pew and Iowa reports fill large information gaps left by federal agencies that have assessed ammonia's health impacts, both by focusing on ammonia's primary source – CAFOs – and by considering ammonia's effects when mixed with other hazardous pollutants. Moreover, both reports conclude that EPA should use the CAA to address the public health threats posed by ammonia and other CAFO emissions.

Taken together these standards, guidelines, and expert recommendations demonstrate that ammonia is a recognized toxic air pollutant that requires CAA regulation to protect the public

[58] *Id*. at 176.
[59] PEW COMMISSION ON INDUSTRIAL FARM ANIMAL PRODUCTION, PUTTING MEAT ON THE TABLE: INDUSTRIAL FARM ANIMAL PRODUCTION IN AMERICA (2008) [hereinafter Pew Commission Report], *available at* http://www.ncifap.org/ (last visited Mar. 18, 2011).
[60] *Id*. at 75.
[61] *Id*. at 69.

health. Even at low levels, acute and chronic exposures to ammonia gas pose significant health threats, and EPA should use this collective evidence base to establish protective NAAQS.

iii. EPA should regulate ammonia under the CAA because unsafe ambient levels of ammonia currently threaten public health

EPA should regulate ammonia under the Clean Air Act because studies show that CAFOs emit ammonia into the air at levels exceeding EPA and ATSDR benchmarks in the ambient air and exceeding NIOSH and OSHA benchmarks at the source, thereby threatening public health in certain areas. Though a limited number of peer-reviewed emissions studies exist, those available found dangerous ammonia concentrations that require regulation to protect nearby residents.

a. CAFO emissions generate ambient ammonia concentrations that exceed EPA's RfC and ATSDR's MRLs

EPA should regulate ambient ammonia because CAFOs emissions give rise to ambient ammonia concentrations that exceed EPA"s chronic exposure RfC and ATSDR"s acute and chronic MRLs, and that therefore may reasonably be anticipated to endanger public health. The agencies derived these benchmarks to identify the threshold level below which long-term exposure is thought to be safe, but above which uncertainty remains. Thus, when ambient ammonia levels exceed these thresholds, those exposed face a possible risk of adverse health effects. This threat can most appropriately be addressed through the NAAQS program.

To date, the most significant studies of ambient ammonia levels from CAFO emissions showed that some CAFOs do in fact cause unsafe ambient ammonia levels, even at significant distances from the facility. While researchers have conducted numerous studies of the health symptoms experienced due to CAFO emissions, and EPA has studied ammonia levels at the CAFO vent, very few studies have actually measured ammonia levels in the ambient air. Two significant studies discussed in this petition are ATSDR"s study of a Missouri hog CAFO and the University of Georgia"s study of a Georgia broiler CAFO.

Missouri Hog CAFO Study

In August of 2003, the ATSDR and the Missouri Department of Health and Senior Services (DHSS) released a CAFO ammonia emissions Health Consultation, reporting the results of an ammonia Exposure Investigation (EI) conducted by ATSDR and DHSS in a community near a large swine CAFO.[62] The agencies conducted the study in response to complaints by

[62] U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation, prepared by the Missouri Department of Health and Senior Services Section for Environmental Public Health, Health Consultation: Final Report on Exposure Investigation Findings, Valley View Concentrated Animal Feeding Operations (Aliases: Concentrated Animal Feeding Operations and Confined Animal Feeding Operations), Green Castle, Sullivan County, Missouri (2003) [hereinafter Missouri Health Consultation].

residents that the air emissions from the CAFO were adversely affecting respiratory health and quality of life.[63]

The investigation focused on ammonia emissions downwind from the Premium Standard Farms Valley View swine CAFO, which at the time had a permit to house 123,648 hogs.[64] Investigators sampled ammonia levels at 6 houses, which they selected based on the proximity of the house to the CAFO, the location of the house downwind from the CAFO, and the willingness of the homeowner to participate in the investigation.[65] The investigators monitored one outdoor and one indoor location at each house.[66] They placed sampling equipment at breathing zone height and monitored each location continuously for no less than 3 consecutive days during the 12 day study.[67] EPA and the Missouri Department of Natural Resources (MDNR) took concurrent samples at the same outside locations, as well as 12-hour time-weighted averages inside the homes, to compare with ATSDR"s results.[68] The study measured ammonia concentration in ppm and reported results as 24-hour maximum discrete measurements (each monitor"s highest measurement each day) and 24-hour averages.[69] ATSDR also surveyed 77 homes within a one-mile radius, and 39 homes between one and two miles from the CAFO, to evaluate residents" perceptions of odors and health symptoms.[70]

In the Health Consultation, ATSDR compared monitoring results with its former acute and chronic MRLs. This discussion will instead use the current MRLs, which ATSDR revised in 2004, as more pertinent benchmarks for possible health impacts.[71] Monitoring from all six of the studied houses resulted in ammonia levels of concern. 41 out of 46 of the study"s maximum discrete measurements, which were reported daily at each house both inside and outside, exceeded the chronic MRL of 0.1 ppm.[72] Daily maximum samples from inside houses 1032 and 1110 also exceeded the acute MRL of 1.7 ppm. Monitors in house 1032 recorded maximum discrete measurements of approximately 4.3 ppm, 2.0 ppm, and 2.0 ppm for Day 1, Day 2, and Day 3 respectively.[73] At 1.9 ppm, the maximum discrete measurement taken inside of house 1110 on Day 1 also exceeded the acute MRL.[74]

The results from the 24-hour averages also give cause for concern. While this study lasted only three days at each home, and ATSDR"s chronic MRL sets a health effects benchmark for exposure exceeding a year, 24-hour averages most closely indicate the amount of ammonia

[63] Missouri Health Consultation at 1.
[64] *Id*. at 2.
[65] *Id*. at 3.
[66] *Id*.
[67] *Id*.
[68] *Id*. at 2-3.
[69] *Id*. at 5-6.
[70] *Id*. at 3.
[71] *See* discussion *supra* Section V.B.1.ii.b.
[72] Missouri Health Consultation at 3.
[73] *Id*. at 6.
[74] *Id*.

these residents breathe on a daily basis. Thus, these averages can most meaningfully be compared with the chronic MRL and the RfC. All of the average measurements inside of houses 1028, 1032, and 1110 during the three-day period exceeded the chronic MRL.[75] In the absence of a longer-term study, all evidence indicates that residents downwind from large CAFOs may suffer health impacts from chronic low-level ammonia exposure.

Three factors in this study indicate that it under-represents the ammonia concentrations and risk faced by this and other rural communities. First, ATSDR acknowledges that the "downwind" homes studied were actually only downwind of the CAFO during approximately 10 percent of the monitoring period, and the Health Consultation also points out that ammonia concentrations were "significantly higher when wind was directed from the site to the monitor."[76] Though Valley View houses an enormous number of hogs, these residents experienced direct emissions only a small percent of the time and lived as far as a mile from the site; communities with CAFOs on multiple sides and that have CAFOs very nearby will likely face elevated ammonia concentrations more often. Second, ATSDR states that land application of manure took place during less than half of the monitoring period, and thus "the maximum period of exposure is not believed to have been attained during this EI."[77] Third, as EPA pointed out in its comments on the draft consultation, ammonia levels increase as wind speed decreases. The study did not take place during the season with lowest wind speeds, thus residents likely breathe higher ambient concentrations during much of the year.[78]

These limitations on the study, limits on the general applicability of ATSDR's MRLs, and ATSDR's use of a less protective and since-replaced chronic MRL in its study, likely contributed to the Health Consultation's conclusion that no apparent public health hazard existed near the houses at the time of the EI. However, as noted previously, EPA commented on the draft report and came to the *opposite* conclusion. In a memorandum written by EPA's Stationary Source Enforcement Branch of the Air Enforcement Division to the Director of the Missouri DHSS, EPA weighed in to "better inform the conclusions in the final report."[79]

EPA's memo acknowledged the complexity of CAFO air emissions, and contrasted the Valley View study with the 2002 Iowa Study.[80] EPA further suggested that the Iowa recommendations apply a more comprehensive analysis than the ATSDR MRLs alone because the Iowa Study considered numerous studies in addition to those relied on by ATSDR, including studies of the aggregate effect that mixed exposures can have on public health.[81] Consequently,

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[75] *Id*. at 5.
[76] *Id*. at 8.
[77] *Id*.
[78] EPA, Office of Enforcement and Compliance Assurance, Memorandum from Mario Jorquera to Scott Clardy, Comments on the Valley View Health Consultation, (Dec. 2002) [Hereinafter EPA Memo].
[79] EPA Memo at 1.
[80] *See* discussion *supra* Section V.B.1.ii.d.
[81] EPA Memo at 2. Note that this letter's discussion of the MRLs refers to the MRLs established in the 1990 ATSDR toxicological profile for ammonia, which predated the more protective chronic MRL adopted in 2004.

the memo emphasized the fact that, "during the Valley View field investigation, the [ATSDR] monitors recorded 60 occurrences of one-hour ammonia concentrations ranging from 153 ppb to 875 ppb, well in excess of the Iowa Study's recommended limit."[82] EPA pointed out that house 1032 was exposed to 10 of these high readings over a 20 hour period and that, in fact, every house studied reported elevated exposures.[83] As a result, EPA found that "the conclusion could be drawn that a *public health hazard* did exist at the time the Valley View data was acquired"[84] (emphasis in original).

EPA's emphasis on the one-hour concentrations measured outside and inside of the studied homes, as well as its adoption of the Iowa Study's far more protective recommendations, demonstrates that the agency understands ammonia's short-term, localized, and additive health effects. The results of the Valley View Health Consultation indicate potential health threats from both short-term and long-term exposure to CAFO ammonia emissions.

EPA should consider the results of the Missouri health consultation and draw on the findings in its own memo, which concluded that ambient ammonia emissions from a single Premium Standard Farms hog CAFO may have created a public health hazard for residents as far as a mile away. The fact that the Valley View CAFO exposed neighbors to ammonia concentrations above the ammonia MRLs and above the recommended exposure limit of the Iowa Report weighs heavily in favor of creating ambient standards for this pollutant, particularly in light of EPA's analysis of multiple pollutant effects, spikes in emissions at certain times of year, the effect of wind directions, and the scientific foundations of the Iowa Report.

Georgia Broiler CAFO Study

In 2009, researchers from the University of Georgia, Athens, released the results of the first study of measured ammonia concentrations in the ambient air near poultry houses.[85] The researchers compared their data with OSHA's and EPA's odor threshold values, as opposed to the health-based MRLs or RfC, which limits the value of the study's conclusions. However, when compared to the more relevant MRLs, RfC, and the Iowa Study's recommendations, the ammonia data collected indicate potential adverse health effects near large poultry facilities.

The researchers set out to measure ammonia concentrations at varying distances from one broiler operation, and to determine the effects of wind speed and direction on ambient ammonia levels.[86] The broiler CAFO studied had four houses, each with approximately 23,500 birds.[87] Monitors measured ammonia concentrations once per minute at various distances from the

[82] *Id*. at 2.
[83] *Id*.
[84] *Id*.
[85] B. D. Fairchild et. al, *Ammonia concentrations downstream of broiler operations*, 18 J. Appl. Poultry Res. 630 (2009), *available at* http://japr.fass.org/cgi/content/full/18/3/630 (last visited Mar. 18, 2011).
[86] *Id*. at 631.
[87] *Id*. at 631-32.

ventilation fans, from 100 to 500 feet, and reported results as 15-minute averages. Measurements were taken over two monitoring periods: a three-week period with measurements at 100-, 200-, and 300-foot distances; and a one-week period with measurements at 100-, 300-, and 500-foot distances. The latter study period included the farther-away monitoring location to account for increased emissions as the birds grew larger, producing more emissions and necessitating higher ventilation rates that create greater total air flow.[88]

Unsurprisingly, the highest ammonia concentrations were strongly correlated with proximity to the broiler houses as well as with times when the monitors were directly downwind of the ventilation fans. The monitors also recorded elevated concentrations during times of low wind speed.[89] After averaging 1,135 15-minute averages over the four-week study, the ammonia concentration at 100 feet from the facility was approximately 0.5 ppm for each study period, and the overall average at 300 feet exceeded 0.3 ppm for each study period. The final week of monitoring recorded an overall average concentration of approximately 0.25 ppm at 500 feet.[90]

While the researchers failed to discuss potential health impacts of their findings, instead comparing the data to EPA"s odor threshold limit of between 5 and 50 ppm, all of these overall averages exceed the chronic MRL, the RfC, and the Iowa Study"s recommended one-hour average limit – some by several times. Moreover, during the study the maximum 15-minute averages exceeded 2 ppm at all but the 500-foot monitor.[91] This study indicates that just one broiler CAFO with fewer than 100,000 birds can cause ambient ammonia levels to exceed chronic and acute health exposure limits, despite variations in wind direction and ventilation practices. As far as the petitioners could determine no published studies to date have measured ambient ammonia concentrations near multiple poultry CAFOs, but multiple CAFOs would increase total ammonia emissions as well as the amount of time that a given residence or public use location would be downwind from emission vents.

The Missouri and Georgia studies both demonstrate that just one CAFO can produce enough ammonia emissions to exceed chronic and acute health thresholds, even without taking the heightened effects of multiple-pollutant exposures into account. Citizens living near one or more large CAFOs require protection from this demonstrated public health threat.

b. The results of EPA's National Air Emissions Monitoring Study show that ammonia emissions may significantly exceed NIOSH and OSHA safety thresholds

[88] *Id*. at 632-33.
[89] *Id*. at 635-37.
[90] *Id*. at 633.
[91] *Id*. at 635.

EPA has recognized the need to study and potentially regulate airborne ammonia from CAFOs, the leading source of U.S. ammonia emissions. From 2007 to 2009 EPA contracted with Purdue University to conduct the National Air Emissions Monitoring Study (NAEMS), which measured emissions of airborne ammonia and other pollutants at 24 CAFO sites in the United States.[92] EPA is currently reviewing the study results to establish emission estimating methodologies for CAFO air emissions.[93] A preliminary assessment of the results from the study, which Purdue presented as a series of 24-hour average values compiled from minute-by-minute monitoring results, shows that most of the monitored CAFOs emit levels of ammonia that exceed OSHA"s PEL and both NIOSH RELs at the emission vent on certain days during the study, and that ammonia emissions fluctuate significantly on a daily and seasonal basis.[94]

The NAEMS study measured ammonia emissions at the vent and at inlet points adjacent to confinement buildings, rather than in the ambient air at a distance from the CAFOs, because the study seeks to establish emissions rates for different types of CAFOs and thereby enable estimates of total CAFO emissions. Due to the nature of the NAEMS data, the petitioners compared these ammonia concentrations with NIOSH and OSHA worker health exposure levels, rather than ATSDR"s or EPA"s exposure recommendations. At-the-vent measures relate most directly to worker health benchmarks, while the ATSDR and EPA health thresholds, intended for the general population, will provide a superior frame of reference for establishing protective NAAQS.

As previously discussed, NIOSH recommends a worker exposure limit of 25 ppm of ammonia averaged over a ten-hour period and 35 ppm averaged over a 15-minute period,[95] while OSHA limits worker exposure to a maximum average ammonia concentration of 50 ppm over an 8-hour time period. Emissions approaching these benchmarks threaten the health and well-being of CAFO workers and also of nearby residents who breathe lower levels of ambient ammonia, but cannot leave the polluted air behind at the end of the work day.

To meaningfully incorporate data measuring emissions at the source into a consideration of whether likely public health threats exist from ammonia in the ambient air, EPA should consider several factors. First, the general public includes populations significantly more sensitive to ammonia than most workers, and thus even if they were protective of worker health, the NIOSH and OSHA standards would not protect public health even for short-term exposures.

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[92] EPA, Air Emissions Monitoring Study, http://www.epa.gov/oecaagct/airmonitoringstudy.html (last visited Mar. 18, 2011); Purdue University, National Air Emissions Monitoring Study Frequently Asked Questions, https://engineering.purdue.edu/~odor/NAEMS/faqs.htm (last visited Mar. 18, 2011). EPA will analyze the results of a Tyson monitoring study in Kentucky as a 25th site when reviewing the NAEMS data. *See* http://www.epa.gov/airquality/agmonitoring/data.html (last visited Mar. 18, 2011).

[93] *See* EPA, Agriculture – Air Monitoring, http://www.epa.gov/airquality/agmonitoring/.

[94] *See* Environmental Integrity Project, *Hazardous Emissions from Factory Farms*, (March 2011), *available at* http://www.environmentalintegrity.org/03_09_2011.php [hereinafter Hazardous Emissions from Factory Farms] (last visited Mar. 18, 2011).

[95] NIOSH, Pocket Guide to Hazardous Chemicals, http://www.cdc.gov/niosh/npg/npgd0028.html.

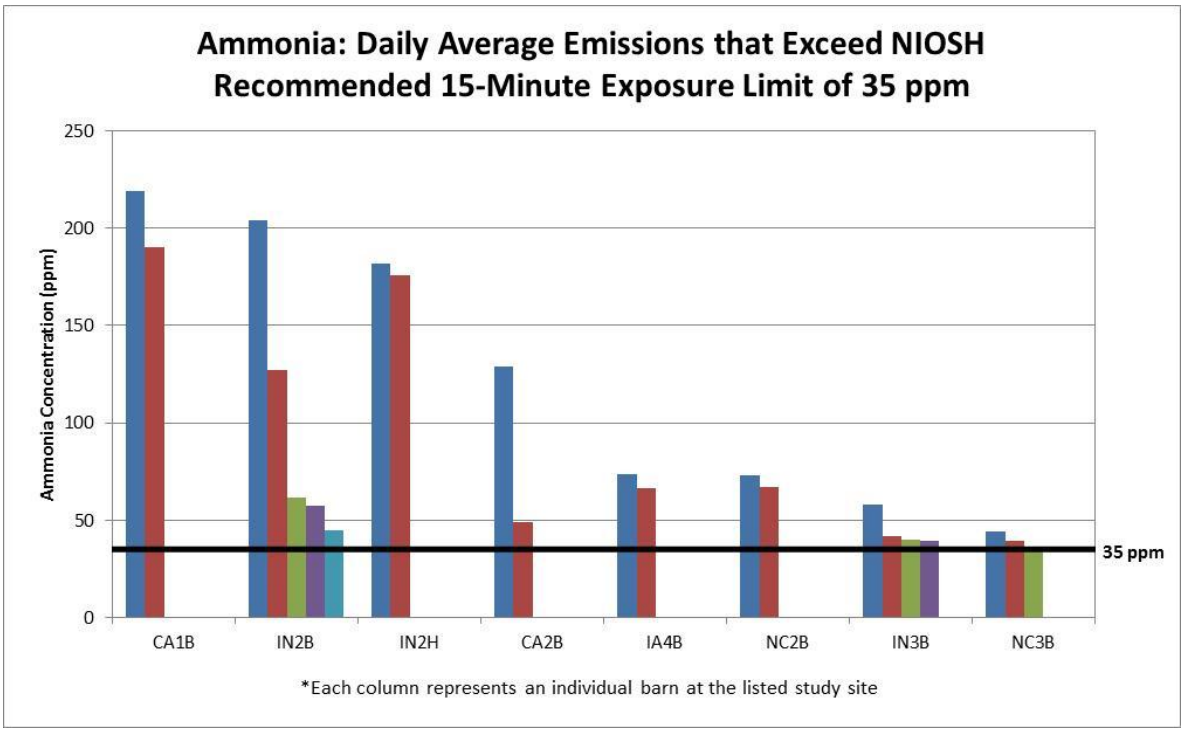
Second, NIOSH and OSHA standards do not consider health effects resulting from continuous intermediate or long-term exposures. Third, the NAEMS data reflect only emissions from a certain part of a CAFO, such as confinement buildings, rather than all emissions sources at or near the site. Finally, many areas contain numerous CAFOs whose emissions mix in the area‟s ambient air, and consequently one cannot make the assumption that ambient ammonia levels will dissipate to safe levels near the source. Whether emissions that exceed NIOSH recommendations or OSHA standards at the vent will also exceed levels that may cause adverse effects – either alone or in combination with other CAFO emissions – and thus may reasonably be anticipated to endanger public health, will vary on a site-to-site basis.

On March 9, 2011, EIP released a report analyzing the data for the 15 confinement sites in NAEMS,[96] which included comparisons of monitoring results with the NIOSH 15-minute REL of 35 ppm. The daily averages can also easily be compared to the 10-hour REL of 25 ppm and the OSHA 8-hour PEL of 50 ppm.[97] Preliminary results from the NAEMS study suggest that CAFO emissions at certain sites commonly exceed both of the NIOSH RELs and even OSHA‟s significantly under-protective 8-hour standard. In fact, 7 of 15 sites had entire days averaging above the OSHA standard, 9 of 15 sites had entire days averaging above the NIOSH 10-hour standard, and as shown below, 8 of 15 sites had entire days averaging above the NIOSH 15-minute standard.[98]

[96] Hazardous Emissions from Factory Farms, supra note 94. The confinement building monitoring sites reviewed in EIP‟s report are CA1B, CA2B, CA5B, IA4B, IN2B, IN2H, IN3B, IN5B, NC2B, NC3B, NC4B, NY5B, OK4B, WA5B, and WI5B.

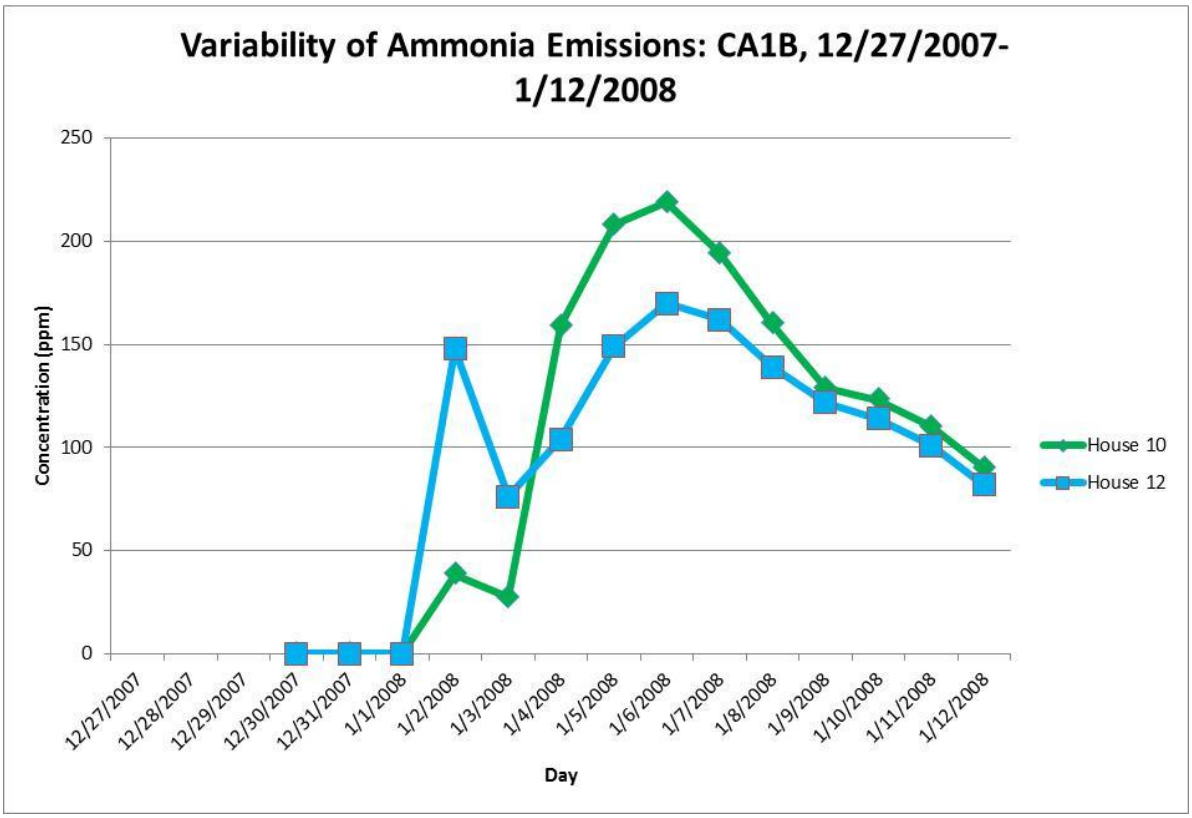
[97] EIP initially sought to compare averages from the monitoring study to the NIOSH RELs and the OSHA PEL by determining the number of 15-minute, 10-hour, and 8-hour exceedances, respectively. However, due to the unavailability of the raw data from the second year of the study, EIP was unable to compile these averages and instead simply identified 24-hour periods during which emissions exceeded the standards. As a result, EIP was also unable to identify very short-term spikes in emissions that may have taken place.

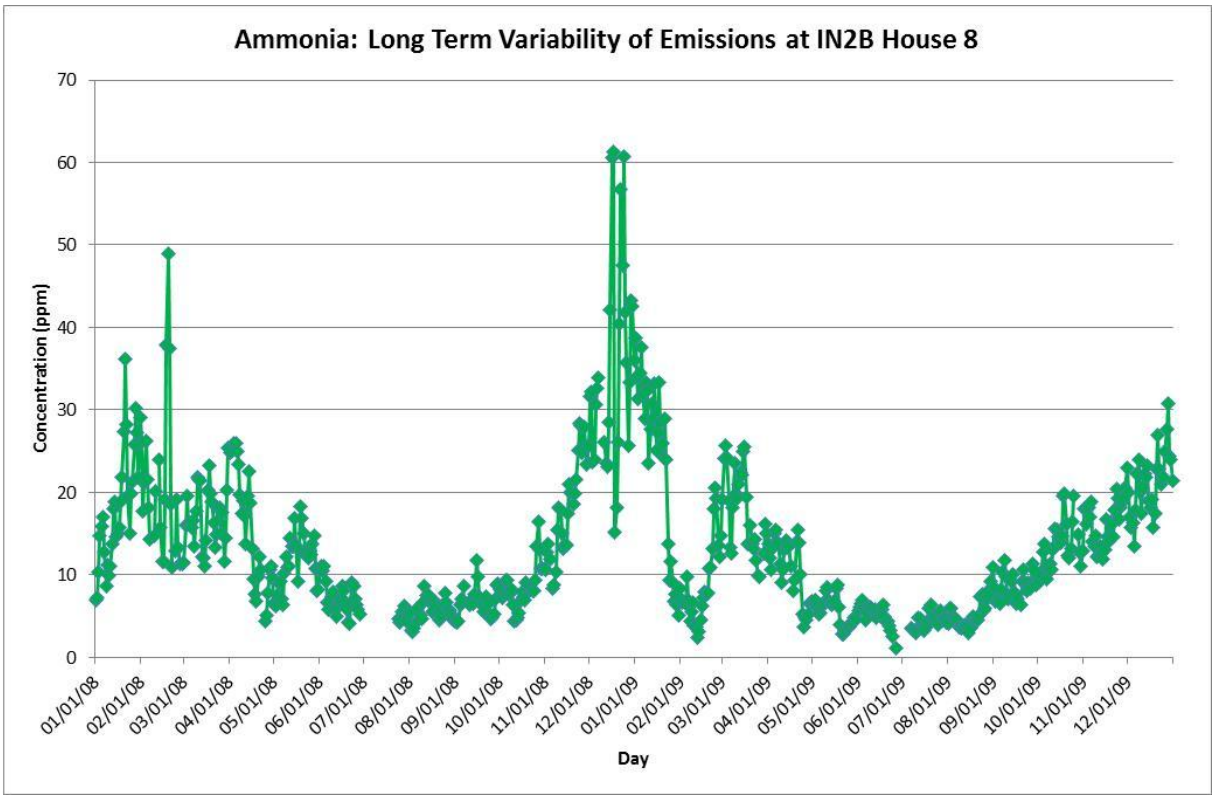
[98] *See* Summary Reports at http://www.epa.gov/airquality/agmonitoring/ and Hazardous Emissions from Factory Farms at 15-16.



In addition to finding numerous exceedances of these time-weighted averages, EIP found that ammonia emissions vary significantly over days and seasons.[99] The following charts, derived from NAEMS data for a California broiler chicken site and an Indiana layer hen site, show both high average concentrations of ammonia on-site and large fluctuations in emissions.[100]

[99] *See* Hazardous Emissions from Factory Farms at 13-15.
[100] *Id*. at 15.


Variability of Ammonia Emissions: CA1B, 12/27/2007-1/12/2008
Concentration (ppm)
250
200
150
100
50
0
12/27/2007
12/28/2007
12/29/2007
12/30/2007
12/31/2007
1/1/2008
1/2/2008
1/3/2008
1/4/2008
1/5/2008
1/6/2008
1/7/2008
1/8/2008
1/9/2008
1/10/2008
1/11/2008
1/12/2008
Day
House 10
House 12


Ammonia: Long Term Variability of Emissions at IN2B House 8
Concentration (ppm)
70
60
50
40
30
20
10
0
01/01/08
02/01/08
03/01/08
04/01/08
05/01/08
06/01/08
07/01/08
08/01/08
09/01/08
10/01/08
11/01/08
12/01/08
01/01/09
02/01/09
03/01/09
04/01/09
05/01/09
06/01/09
07/01/09
08/01/09
09/01/09
10/01/09
11/01/09
12/01/09
Day

This initial assessment suggests that EPA"s representative CAFOs emit ammonia at levels significantly above worker health benchmarks. The petitioners urge EPA to promptly complete its independent review of Purdue"s study and the NAEMS data, and establish emission estimating methodologies that will enable EPA to accurately inventory CAFO ammonia emissions nationwide.

Although these at-the-vent measures cannot be directly translated into ambient ammonia levels, the NAEMS study"s findings still bear on EPA"s consideration of ammonia"s public health impacts. As this petition discusses in the following section, because many regions and communities contain high concentrations of CAFO facilities, EPA cannot assume that at-the-vent measures do not affect ambient ammonia levels. Moreover, because the NAEMS data show that CAFO ammonia emissions are not stable in quantity and rate, but rather spike to high levels for short durations and vary significantly throughout the year, EPA cannot discount at-the-vent measures under the assumption that all emissions will dissipate to safe levels before impacting nearby residents. EPA should consider the NAEMS data when assessing the public health threat of ambient ammonia from CAFOs.

c. Ammonia in CAFO emissions contributes to documented adverse health impacts on nearby residents

Studies of public health in communities near CAFOs indicate that air emissions from these operations, including ammonia emissions, adversely affect respiratory health of residents breathing ambient air near CAFOs. Although these studies examine the health effect of combined air pollutants from livestock operations, rather than attempting to isolate the effects of ammonia emissions, the CAA requires EPA to list as criteria pollutants those pollutants that "*contribute to* air pollution which may reasonably be anticipated to endanger public health" (emphasis added) § 108(a)(1)(A). Ammonia is a known toxin and respiratory irritant emitted by CAFOs in vast quantities, and therefore clearly "contributes to" the air pollution causing known health impacts near these facilities.

The 2002 Iowa Study reviewed research on both occupational and community exposures to CAFO air emissions and their documented health impacts. Though occupational exposures have been more extensively researched, the Study authors found "experimental and epidemiological evidence that very low levels of exposures to ammonia…may result in adverse health effects among healthy volunteers and community residents."[101] Despite the relatively small number of peer-reviewed studies of community health impacts that existed at the time, the Iowa Study concluded that the research base was sufficient to "support a conclusion that CAFO air emissions constitute a public health hazard."[102]

[101] Iowa Study at 138.
[102] *Id*.

One sociological study considered by the Iowa Study authors involved a survey of 18 Iowa residents who lived within 2 miles from a 4,000 head sow confinement operation.[103] The study compared self-reported answers from the hog CAFO neighbors with those of a control group that did not live near significant livestock production,[104] and separated health impacts into four categories of symptoms commonly experienced by CAFO workers: 1) cough, sputum, shortness of breath, chest tightness, and wheezing; 2) dizziness, weakness, fainting, and nausea; 3) plugged ears and headaches; 4) scratchy throat, runny nose, and burning eyes.[105] The study found an increase in all four groups of symptoms among residents in the hog CAFO community.[106]

Another study considered both health effects and quality of life impacts of living near CAFOs. Researchers interviewed 155 residents from three North Carolina communities: one near two industrial cattle facilities, one near a 6,000 head hog CAFO, and one without any CAFOs nearby.[107] The study asked questions about rural health, rather than the livestock operations, to avoid bias. Residents near the hog CAFO reported higher rates of several respiratory and other symptoms compared to the control group, including headaches, coughing, sore throat, burning eyes, diarrhea, and runny nose.[108]

New research further supports the Iowa Study's findings. In March 2011, Schinasi, et al. published an epidemiological study correlating air pollution from hog CAFOs in North Carolina with self-reported health effects among community residents.[109] The study examined associations between monitored air pollutants and physical symptoms among 16 communities living within 1.5 miles of hog operations.[110] Although monitored pollutants did not include ammonia, participants also reported overall odor levels. The researchers found that "[i]rritation symptoms were elevated in association with odor"[111] and concluded that "pollutants near hog operations cause acute physical symptoms, particularly upper respiratory symptoms and irritation of the nose and eyes."[112]

The Pew Commission report also reviewed research on the public health effects of CAFOs, and similarly found that living in close proximity to CAFOs has documented adverse health effects. In particular, studies have shown respiratory health impacts from CAFO air

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[103] Thu et al., *A Control Study of the Physical and Mental Health of Residents Living Near a Large-Scale Swine Operation*, 3 J. of Agric. Safety and Health (1997).
[104] *Id*.
[105] *Id*.
[106] *Id*. Cluster 4 showed a slight prevalence in the hog community (with the exception of the "other" symptoms in cluster 4, which did not show a difference between the two communities studied).
[107] Steve Wing and Susanne Wolf, *Intensive Livestock Operations, Health and Quality of Life Among Eastern North Carolina Residents*, 108 Envt'l Health Perspectives (March 2000).
[108] *Id*. at 237.
[109] Schinasi, et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 Epidemiology 2 (March 2011) [hereinafter Schinasi].
[110] *Id*. at 1.
[111] *Id*. at 5.
[112] *Id*. at 7.

emissions; primary respiratory effects included increased incidence of asthma among both children and adults. The Commission identified four "large epidemiological studies" that found "strong and consistent" links between CAFO pollution and asthma,[113] concluding that communities near CAFOs "are subject to air emissions that, although lower in concentration [than worker exposures], may significantly affect certain segments of the population."[114]

A 2005 study simulated the health effects of short-term exposure to hog CAFO emissions, by diluting hog CAFO air and exposing 24 healthy adults (12 male, 12 female) for one hour at a time on two separate occasions.[115] The researchers exposed a control group of 24 healthy adults to clean air for the same time period. The study measured objective health indicators, such as blood pressure, and participants also self-reported symptoms such as headaches and nausea and completed a Profile of Mood States survey.[116] The diluted hog confinement air had an ammonia concentration of 817 ppb (0.817 ppm)[117] – well below levels observed in the ambient air near some CAFOs, yet several times the 150 ppb one-hour standard recommended in the Iowa Study. After just an hour of exposure, those exposed to the hog confinement air were four times as likely to report headaches, six times more likely to report eye irritation, and nearly eight times as likely to report nausea than the control group.[118]

Another recent study compared nation-wide, county-level data on infant mortality rates and causes with geographic shifts in the livestock industry over two decades, in order to assess the impacts of living in proximity to livestock on infant mortality and the probable mechanisms for any impact observed.[119] After controlling for numerous variables and potential sources of bias, the author found that "a 100,000 animal unit increase [at the county level] corresponds to 123 more infant deaths per 100,000 births," with about 80% of these occurring during first 28 days of life.[120] Given the robustness of the data set, this demonstrates a "statistically significant correlation between livestock and infant death."[121] Of these mortalities, only respiratory and perinatal causes of death were affected, "suggesting an air pollution mechanism."[122] Of the many constituents of livestock air emissions, the study cites ammonia and hydrogen sulfide as

[113] Pew Commission Report at 17.
[114] *Id*.
[115] Susan S. Schiffman et al., *Symptomatic Effects of Exposure to Diluted Air Sampled from a Swine Confinement Atmosphere on Healthy Human Subjects*, 113 Envt'l Health Perspectives 5 (May 2005).
[116] *Id*. at 568-70.
[117] *Id*. at 568.
[118] *Id*. at 573.
[119] S. Sneeringer, *Does Animal Feeding Operation Pollution Hurt Public Health? A National Longitudinal Study of Health Externalities Identified by Geographic Shifts in Livestock Production*, 91 Amer. J. of Agric. Econ. 1 (Feb. 2009).
[120] *Id*. at 129.
[121] *Id*.
[122] *Id*. at 125.

the "main gases in question," because both have been linked to respiratory infections and distress in infants, perinatal disorders, and spontaneous abortion.[123]

d. CAFOs emit vast quantities of ammonia and are often concentrated geographically

i. CAFOs emit vast quantities of ammonia

EPA should regulate ambient ammonia because estimated CAFO ammonia emission rates indicate that these facilities release vast quantities of ammonia into the ambient air, creating a heightened health threat to communities near numerous and/or very large CAFOs. CAFOs are leading contributors to the nation"s ammonia inventory; by one EPA estimate livestock account for approximately 80 percent of total emissions.[124] CAFOs also emit a disproportionately large share of the ammonia in certain states and communities. One striking example is Threemile Canyon dairy farm near Boardman, Oregon, which reported ammonia emissions as high as 15,500 pounds per day in 2005 – more than the nation"s number one manufacturing source of the pollutant.[125] Two studies – the Tyson Broiler Report and the Purdue NAEMS Layer Site study – measured the emission rates of ammonia released from broiler houses and layer barns, respectively. EIP used these emission rates to roughly estimate poultry CAFO ammonia emissions on a much broader scale, and found that poultry CAFOs in several states release an overwhelming majority of those states" ammonia emissions.

In May 2007, Iowa State University and the University of Kentucky released the "Tyson Broiler Ammonia Emission Monitoring Project: Final Report."[126] The report, which Tyson agreed to participate in pursuant to a settlement with the Sierra Club,[127] summarized a study in which university researchers measured ammonia emissions from two broiler houses in Western Kentucky with Mobile Air Emissions Monitoring Units (MAEMUs) attached to each house.[128] Each house had a series of six flocks of broiler chickens, with growing periods of just over 50 days each and several days in between flocks, during the approximately 13-month continuous study.

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[123] *Id*. at 126.
[124] MICHIEL R.J. DOORN ET AL., EPA, REVIEW OF EMISSIONS FACTORS AND METHODOLOGIES TO ESTIMATE AMMONIA EMISSIONS FROM ANIMAL WASTE HANDLING 1 (2002), *available at* http://www.epa.gov/nrmrl/pubs/600r02017/600sr02017.pdf (last visited Mar. 18, 2011).
[125] Michele M. Merkel, Senior Counsel, Envtl. Integrity Project, N.Y. State Bar Association presentation at Albany Law School: The Use of CERCLA to Address Agricultural Pollution, at 1 (Sept. 15, 2006), *available at* http://www.environmentalintegrity.org/pdf/publications/The_Use_Cercla.pdf (last visited Mar. 18, 2011).
[126] Iowa State University and the University of Kentucky, *Tyson Broiler Ammonia Emission Monitoring Project: Final Report*, p. 1-34 (May 1 2007) [hereinafter Tyson Broiler Report].
[127] *See* Sierra Club, *Grassroots Stories*, http://www.sierraclub.org/grassroots/stories/00027.asp (last visited Mar. 18, 2011).
[128] Tyson Broiler Report at 2.

The MAEMUs measured ammonia concentration every 30 seconds from three locations inside of the houses and every two hours at one location just outside of the houses.[129] The researchers converted the raw ammonia concentration data into emission rates, in pounds of ammonia per day per house (lb/d-house).[130] This resulted in a 12-flock mean emission rate of 30.8 +/- 20.0 lb/d-house.

A 2007 Purdue study conducted as part of EPA's NAEMS study, discussed above in section (b), shows that laying hen operations also emit vast quantities of ammonia. Purdue released a site report for an Indiana NAEMS site, which measured ammonia concentrations and emissions rates inside two barns (Barns 6 and 7) housing laying hens. The report analyzed monitoring results collected between May 12 and June 30, 2007.[131] The monitors recorded the concentration of ammonia in ppm, and then converted those data into emission rates. The researchers calculated average daily mean ammonia emission rates of 252 +/- 99 and 308 +/- 63 kg/day for barns 6 and 7 respectively.[132]

In December of 2009, EIP finalized a report entitled "A Holiday Gift for Big Poultry: Bush Administration Rushes Emissions Reporting Exemption," which extrapolates from these two studies' emission rates.[133] Using the number of broiler chickens and egg laying hens per state,[134] EIP calculated an estimate of the total pounds of ammonia released by the top ten poultry producing states in 2007 and the total pounds of ammonia released in the top ten states for each type of poultry CAFO.

EIP's report found that, according to these studies' emission factors, poultry operations in just the top ten states released an estimated 700 million tons of ammonia into the air in 2007. These 10 states emit more ammonia from poultry facilities than all other non-agricultural

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[129] *Id*. at 8.

[130] *Id*. at 1. The results varied significantly between the two houses, primarily due to different manure handling methods: one house received new rice hull bedding and had litter removed mid-way through the study, while the other had the same bedding and no litter de-caking during the study. The house that received new litter after several flocks had significantly lower emissions while the houses had birds in them, but significantly higher average emissions during the downtime between flocks, possibly due to the de-caking activity releasing ammonia. *Id*. at 21. These results underscore the importance of considering waste management practices, emissions from litter stockpiles, and emissions from land application of waste, when evaluating the public health impacts of CAFO ammonia emissions. Thus, even the ammonia emissions estimates in EIP's study, summarized below, do not include all emissions from litter removed from poultry houses.

[131] Purdue University, *National Air Emissions Monitoring Study Data from Layer Site IN2H, May 12 to June 30 2007* at 1, 10, Figure 4 [hereinafter Purdue Study].

[132] Purdue Study at 15.

[133] Environmental Integrity Project, *A Holiday Gift for Big Poultry: Bush Administration Rushes Emissions Reporting Exemption*, (Corrected December 2009), *available at* http://environmentalintegrity.org/news_reports/Bush_administration.php. [Hereinafter EIP Report] (last visited Mar. 18, 2011).

[134] As provided by the U.S. Department of Agriculture's *Poultry-Production and Value 2007 Summary*, released April 2008, and the U.S. Department of Agriculture's *Chicken and Eggs*, released November 21, 2008.

industries in the entire U.S. emit combined.[135] Looking at the two types of poultry production individually, broiler chicken operations in the top ten states[136] emitted an estimated 481,764,049 pounds of ammonia in 2007, which is greater than eight times the amount of ammonia emissions reported to the Toxic Release Inventory (TRI) by all industrial sources in those ten states combined.[137] Egg laying operations in the top ten states[138] emitted an estimated 221,551,888 pounds of ammonia per year.[139] These emissions approximately triple the amount that all industrial sources in those states combined reported to the TRI.[140]

As indicated above, industrial sources must report their ammonia emissions to the TRI under the Emergency Planning and Community Right-to-Know Act (EPCRA).[141] The TRI program does not require CAFOs to report emissions, however, even though they emit the dominant share of total ammonia emissions. Consequently, the TRI ammonia totals reported by industries in the top ten states for broilers and egg laying operations bear little relation to the total volume of ammonia released into the air in these states. For instance Georgia, the nation"s number one producer of broiler chickens, emitted an estimated 97,618,755 pounds of ammonia from CAFOs in 2007, yet the state"s industrial sources combined reported only 11,936,373 pounds of ammonia to the TRI.[142] Similarly Iowa, the nation"s number one producer of eggs, emitted an estimated 53,012,347 pounds of ammonia into the air from its layer hen CAFOs, while the state"s industrial sources reported only 9,425,300 pounds to the TRI.[143]

Hog CAFOs also emit large quantities of ammonia. The Iowa Study researchers evaluated several peer-reviewed studies of hog CAFO ammonia emissions, establishing a range of emission factors for various stages of hog maturity, including nursery pigs and finishing pigs.[144] These studies indicate that many factors, such as ventilation system, animal maturity, waste storage system, season, and outside temperature significantly affect ammonia emission rates.[145] The highest measured emission rate for a hog nursery included in the Iowa Study, 160 g ammonia per animal unit per day,[146] translates to a daily emission of 353 pounds of ammonia for a facility at the Large CAFO threshold size.[147] The highest reported emissions from a hog finishing facility, 311 g ammonia per animal unit per day during summer,[148] translates to a daily

[135] EIP Report at 1.
[136] Georgia, Arkansas, Alabama, Mississippi, North Carolina, Texas, Kentucky, Maryland, Virginia, and Delaware.
[137] EIP Report Attachment A.
[138] Iowa, Ohio, Indiana, Pennsylvania, Georgia, Texas, California, Arkansas, North Carolina, and Florida.
[139] EIP Report Attachment A.
[140] *Id*.
[141] *See* EPA, What is the Toxics Release Inventory Program, at http://www.epa.gov/TRI/triprogram/whatis.htm (last visited Mar. 18, 2011).
[142] EIP Report, Attachment A.
[143] *Id*.
[144] Iowa Study at 48-49.
[145] *Id*.
[146] *Id*. at 49.
[147] 40 C.F.R. §122.23(b)(4).
[148] Iowa Study at 49.

emission of 686 pounds of ammonia for a facility at the Large CAFO threshold size. These studies demonstrate that, particularly during summer, hog CAFOs emit vast quantities of ammonia. Though Iowa leads the nation in hog production, it is not the only state of concern. According to the North Carolina Department of Environment and Natural Resources‟ 1995 estimates, North Carolina sources released an enormous 355 million pounds of ammonia into the air that year, of which hog operations alone released 166 million pounds.[149]

EIP‟s analysis of EPA‟s NAEMS data also indicates that most CAFOs monitored emit more than the reportable quantity – 100 pounds – of ammonia on a typical day, and some facilities studied emit thousands of pounds on a typical day.[150] As discussed previously, ammonia emissions also vary significantly over both the short and long term, such that large CAFOs can emit many thousands of pounds of ammonia on certain days. Although NAEMS did not measure ambient ammonia levels in communities near these operations, the sheer volume of total ammonia emissions from CAFOs – particularly poultry CAFOs – creates cause for concern that those living or working near numerous or very large CAFOs may breathe unsafe levels of ammonia in the ambient air.

CAFOs emit the majority of ammonia emissions but remain largely unaccountable for their air pollution. Despite the gap in emissions knowledge EPA‟s limited TRI reporting system and livestock exemption from CERCLA reporting have created, available emissions research and EIP‟s analysis of the Tyson and Purdue studies demonstrate the need to regulate CAFO ammonia emissions commensurate with their controlling contribution to total ammonia pollution. EPA should consider these studies‟ findings as to the enormous quantities of ammonia CAFOs currently emit in certain regions when deciding whether to list ammonia as a criteria pollutant.

ii. CAFOs are geographically concentrated

This vast quantity of airborne ammonia emitted by CAFOs does not exist at equal concentrations throughout the U.S. or throughout certain agricultural states; rather, CAFOs and the ammonia they release are concentrated in certain geographic regions, creating areas with an elevated risk of ammonia-related health effects for nearby rural populations. Many rural communities breathe the emissions from not just one or two CAFO barns, but from many CAFOs, each of which contains numerous barns.

Concentration of CAFOs in certain geographic areas has increased dramatically in recent years, and exists on a far more localized scale than the state-level concentration demonstrated in EIP‟s poultry emissions report. The Government Accountability Office (GAO) discussed this trend in its 2008 report “Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of

[149] North Carolina Department of Environment and Natural Resources Division of Air Quality, *Status Report on Emissions and Deposition of Atmospheric Nitrogen Compounds from Animal Production in North Carolina*, Table 1 (June 1999), *available at* http://daq.state.nc.us/monitor/projects/nstatusreport.pdf (last visited Mar. 18, 2011).
[150] Hazardous Emissions from Factory Farms at 12-13.

Concern."[151] In its report, GAO concludes that CAFOs are "increasingly clustered within specific geographic areas within a state,"[152] and cites several alarming examples of communities besieged by CAFOs housing many millions of confined animals in small areas.

One such area, comprised of five contiguous counties in North Carolina, alone housed more than 7.5 million hogs and produced as much as 15.5 million tons of manure in 2002.[153] This increased concentration is not limited to the hog industry. GAO also highlights two California counties in the San Joaquin Valley that contained 535,433 cows in 2002, producing approximately 13.6 million tons of manure that year.[154] Similarly, in Arkansas just two counties had amassed broiler chicken CAFOs housing 14,264,828 chickens in 2002, producing more than 471,000 tons of manure that year.[155]

Yet another example of intense livestock concentration is the Delmarva Peninsula, where contract producers raise approximately 568 million broiler chickens per year, generating an estimated 1.1 billion pounds of chicken litter.[156] This averages more than a staggering 104,000 chickens per square mile on the 5,450 square mile peninsula. Experts have raised concerns that such incredible quantities of waste cannot be applied to the surrounding area"s available cropland at agronomic rates;[157] for similar reasons, the emissions from these quantities of manure and numbers of livestock confinements should raise concerns that ambient concentrations of ammonia and other emitted pollutants will exceed safe levels.

Rural residents throughout the U.S. live in close proximity to CAFO production areas and manure application fields – some in areas that contain numerous CAFOs in close proximity to one another, whose ammonia emissions mix in the ambient air and cause significant local re-deposition.[158] EPA should consider the aggregate effects of ammonia emissions on ambient air concentrations in these rural communities and the commensurately higher impact emissions have on public health in these areas with high concentrations of CAFOs.

The growing body of CAFO ammonia emissions research, which includes monitoring both at the source and at nearby residences, collectively compels the conclusion that ambient ammonia air pollution currently surpasses established health benchmarks and thus may reasonably be anticipated to endanger public health. To designate ammonia as a CAA criteria

[151] GAO, *Concentrated Animal Feeding Operations: EPA Needs More Information and a Clearly Defined Strategy to Protect Air and Water Quality from Pollutants of Concern* (Sept. 2008) [hereinafter GAO Report].
[152] GAO Report at 5.
[153] *Id* at 21.
[154] *Id*. at 22.
[155] *Id*.
[156] Karen Gardner, *Farmer: Chesapeake Bay cleanup requires unity*, FREDERICK NEWS POST, Dec. 3, 2010, *available at* http://www.fredericknewspost.com/sections/news/display.htm?storyid=113253 (last visited Mar. 18, 2011).
[157] GAO Report at 22.
[158] *See* discussion of ammonia transport and fate, *infra* Section V.B.2.ii.

pollutant, EPA does not need to find that all Americans currently breathe unsafe levels of ammonia, or even that residents near CAFOs and other ammonia sources are suffering life-threatening or permanent health effects. On the contrary, the CAA gives EPA significant discretion to enact health protections even if it lacks absolute scientific certainty about the nature or extent of the threat and even if the entire population is not affected.[159]

e. Ammonia is a significant precursor to $PM_{2.5}$, and endangers public health by contributing to violations of the fine particulate NAAQS

The CAA requires EPA to consider criteria pollutant precursors as well as criteria pollutants themselves, by defining "air pollutant" to include "any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term "air pollutant" is used." CAA § 302(g). EPA has identified ammonia as a precursor pollutant to small particulate matter ($PM_{2.5}$), but does not currently require states to regulate ammonia as a precursor pollutant "unless the State or EPA makes a technical demonstration that emissions of ammonia from sources in the State significantly contribute to $PM_{2.5}$ concentrations in a given nonattainment area."[160]

Although some airborne ammonia will re-deposit close to the emission source, ammonia gas reacts readily with acidic compounds in the air, such as nitric acid, hydrochloric acid, and sulfuric acid, forming small particles known as ammonium aerosols."[161] These particles of ammonium nitrate and ammonium sulfate have diameters smaller than 2.5 microns, and thus qualify as $PM_{2.5}$ – a regulated CAA criteria pollutant. EPA has recognized the health impacts of particulate pollution, and $PM_{2.5}$ in particular, for decades, so this petition will not address them in detail. EPA"s current NAAQS for $PM_{2.5}$ are meant to protect the public health and welfare from the respiratory symptoms, decreased lung function, aggravated asthma symptoms, chronic bronchitis, irregular heartbeat, heart attacks, and premature death associated with small particle pollution.[162] These NAAQS do not require ammonia regulation, however, despite recent research indicating that ammonia contributes significantly to $PM_{2.5}$.

One recent study clarifies the role ammonia plays in $PM_{2.5}$ formation and seasonal $PM_{2.5}$ variations.[163] Researchers used the Community Multiscale Air Quality chemical transport model[164] to predict the environmental impact of ammonia emissions in $PM_{2.5}$ non-attainment

[159] *See* discussion of EPA"s Sulfur Dioxide Rule, *infra* Section VI.
[160] Rich Damberg, EPA Office of Air Quality Planning and Standards, *Policies for Addressing PM2.5 Precursor Emissions* (June 20, 2007) at Slide 8.
[161] Aneja at 516.
[162] EPA, Particulate Matter: Health and Environment, http://www.epa.gov/pm/health.html (last visited Mar. 18, 2011).
[163] R. W. Pinder et al., *Environmental Impact of Atmospheric NH_3 Emissions Under Present and Future Conditions in the Eastern United States*, 35 Geophysical Res. Letters (June 2008) at 2 [hereinafter Pinder].
[164] *See* EPA, Atmospheric Modeling and Analysis Division, Community Multiscale Air Quality (CMAQ), http://www.epa.gov/AMD/CMAQ/ (last visited Mar. 18, 2011).

areas, considering future scenarios in which EPA's recently amended regulations have reduced emissions of oxides of nitrogen (NO_x) and sulfur oxides (SO_x). The authors explain that although ammonia can react with either NO_x or SO_2 to form small particulates, in the absence of ammonia NO_x will stay in gaseous form, while SO_2 can readily react with other compounds to form other small particles. Because in winter a higher proportion of $PM_{2.5}$ is ammonium nitrate (formed from ammonia and NO_x) than in summer, the "sensitivity of $PM_{2.5}$ to ammonia emissions reductions" is greatest in winter[165] and thus reductions in winter ammonia emissions may significantly reduce $PM_{2.5}$. This conclusion supports findings in previous studies that under certain circumstances winter ammonia emissions reductions can be an even "more effective and less costly control strategy for $PM_{2.5}$ than reductions in NO_x and SO_2."[166] The modeling further suggests that "NH_3 emission controls will continue to be an effective strategy to achieve further reductions in winter $PM_{2.5}$, even considering the planned reductions in NO_x and SO_2 emissions."[167]

Other studies have estimated ammonia's contribution to $PM_{2.5}$ and the contribution of ammonia from livestock in particular. One study looked at the constituents and sources of $PM_{2.5}$ in the eastern U.S., concluding that "ammonia comprises a significant portion of the $PM_{2.5}$ mass" in the region – 47 percent.[168] Penn State researchers have looked specifically at livestock's contribution to ammonium nitrate formation. Using the conservative estimate that livestock contribute only 51 percent of total ammonia emissions, the study found that livestock ammonia emissions lead to the formation of 9 to 11 percent of total U.S. $PM_{2.5}$, while in winter in the Upper Midwest this contribution may be as high as 20 percent.[169] EPA's failure to consider ammonia's localized and seasonal effects on $PM_{2.5}$ concentrations, and to require state regulation of ammonia sources in $PM_{2.5}$ non-attainment areas, contravenes current research.

The evidence provided in this petition demonstrates that ammonia clearly meets the CAA criteria pollutant standard: ammonia emissions cause or contribute to air pollution – both ammonia itself and $PM_{2.5}$ – that may reasonably be anticipated to endanger public health. EPA should make an endangerment finding, designate ammonia as a criteria pollutant, and establish primary NAAQS that will protect public health with an adequate margin of safety.

2. Ammonia emissions endanger public welfare

CAA § 109(b)(2) requires EPA to establish secondary NAAQS for criteria pollutants, set at levels that protect the public welfare "from any known or anticipated adverse effects

[165] Pinder et al. at 2.
[166] *Id*. at 1.
[167] *Id*. at 4.
[168] Natalie Anderson et al., *Airborne Reduced Nitrogen: Ammonia Emissions from Agriculture and Other Sources*, 29 Env't Int'l (2003) at 277.
[169] Alexander N. Hristov, Associate Professor of Dairy Nutrition, Penn State Department of Dairy and Animal Science, *Livestock Contribution to Fine Particulate Matter (PM2.5) in the U.S.*, 16 February 2009, *available at* http://www.das.psu.edu (search "particulate matter") (last visited Mar. 18, 2011).

associated with [the criteria pollutant] in the ambient air." Public welfare has many dimensions, which include environmental and economic impacts as well as psychological health and quality of life.

CAA §302(h) defines "welfare" broadly and non-exclusively:

> "[a]ll language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants."

This open-ended definition demonstrates Congress' understanding that air pollution has numerous and complex adverse effects, and its intent that EPA should exercise its broad regulatory authority to mitigate any and all of them. This section will provide evidence of the public welfare impacts of ammonia emissions, alone and in combination with other CAFO emissions, on personal comfort and well-being, water and soil quality, property values, and visibility.

i. Ammonia emissions threaten personal comfort and well-being

Airborne ammonia most obviously impacts a person's personal comfort and well-being through odor. Airborne ammonia has a pungent, unpleasant smell often associated with urine. Indeed, many complaints from communities that live close to CAFOs concern the effects of the odor emanating from the CAFOs on their daily lives.[170] These nuisance effects of ammonia odor on important aspects of public welfare exist independent of the public health effects from more elevated ambient concentrations. The odor released from CAFOs typically includes a mixture of hydrogen sulfide (H_2S), volatile organic compounds (VOCs), ammonia, and other gases.[171] However, although airborne ammonia is only one component of the cumulative odor emitted from CAFOs, they release it in vast quantities.

Moreover, though many pollutants from CAFO emissions combine to cause the nuisance odors that impact several aspects of public welfare, this does not lessen EPA's obligation to address ammonia's public welfare impacts. Congress anticipated this scenario when drafting the CAA, and specifically included effects "caused by…combination with other air pollutants" in its definition of welfare. CAA § 302(h). Ammonia is a primary pollutant in CAFO air emissions, emitted in large quantities from CAFOs housing all types of livestock, and EPA should act to

[170] *See, e.g.,* Iowa Study at 71.
[171] EPA, Animal Feeding Operations Air Agreements, http://www.epa.gov/compliance/resources/agreements/caa/cafo-agr.html (last visited Mar. 18, 2011). *See also* Schiffman, et al., *Quantification of odors and odorants from swine operations in North Carolina*, 108 Agric. and Forest Meteorology (2001).

mitigate the community well-being and public welfare impacts of ammonia in combination with other CAFO air pollution.

The 2008 Pew Commission Report surveyed research on the social and community impacts of CAFO emissions. The Commission concluded that residents near CAFOs "are subject to air emissions that, although lower in concentration [than worker exposures], may significantly affect certain segments of the population."[172] After reviewing existing research, the Commission identified community physical and mental health effects such as respiratory symptoms and neurobehavioral effects such as depression.[173] The Commission also considered the effect of CAFO odor compounds on mood, and determined that due to the toxicity and odor of ammonia and other CAFO emissions it is "not surprising" that existing studies have shown "increased rates of neurobehavioral symptoms such as depression."[174]

The North Carolina study previously discussed evaluated quality of life factors in addition to health symptoms.[175] The study evaluated quality of life indicators by calculating the number of days that the community members had to stay inside or keep windows closed during good weather. Because those living near the hog CAFO had to stay indoors significantly more often than the other groups, the study concluded that proximity to the hog CAFO reduced this community's quality of life.[176]

Another North Carolina study used a "Profile of Mood States" test to compare the psychological state of 44 community members living close to a large swine confinement to the psychological state of community members who did not live close to the swine confinement.[177] The study showed that members living close to the swine confinement experienced more anger, tension, and depression than the control group; they also suffered physical effects, experiencing more fatigue and confusion than the control group.[178]

The Iowa Study also reviewed numerous polls and surveys of the nuisance effects of livestock operations, including odors and air pollution. The Study found that rural residents find livestock odors a major nuisance, and that odors, rather than traffic, noise, dust, flies, or other problems, create the significant majority of the nuisance issues arising from CAFOs in close proximity. Moreover, those surveyed reported that larger farms were a greater nuisance than smaller ones.[179]

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[172] Pew Commission Report at 17.
[173] *Id*.
[174] *Id*.
[175] Steve Wing and Susanne Wolf, *supra* note 107.
[176] *Id*. at 236; Iowa Study at 150.
[177] Iowa Study at 137, *citing* Schiffman et al., *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*, 17 Brain Res. Bulletin (1995).
[178] *Id*.
[179] Iowa Study at 149-50.

These studies detail some of the difficult-to-quantify effects of CAFO ammonia emissions on personal comfort and well-being. Emotions such as depression, anger, and fatigue play a central role in personal well-being, and therefore in public welfare. Similarly, the degree to which rural residents may open their windows, go outside, and otherwise enjoy their property directly affects both comfort and well-being. When rural citizens lack these basic rights and comforts – things most Americans take for granted – the public welfare suffers. The authors of the Iowa Study drew a similar conclusion, reporting that CAFO neighbors often hesitate to make social plans at their houses because they have no control over what the air quality will be like on a certain day, and as a result, CAFOs reduce social capital.[180]

The Iowa Study and Pew Commission Report also found correlations between increased size and industrialization of livestock operations and overall social and economic decline. One such study noted by both the Iowa and Pew reports contrasted family farm and industrial agricultural areas in 98 counties across several states, concluding that farm size and mechanization "significantly predict declining community conditions not merely at the local agricultural community level, but in the entire county."[181] The Iowa Study's review of Midwest CAFO research also found "tendencies of economic decline in communities with greater concentration of CAFOs."[182] While these studies do not attempt to discern the share of these impacts attributable directly to ammonia and other air emissions, these emissions cause demonstrated adverse welfare impacts and clearly contribute to the observed trends of social decline. Because numerous peer-reviewed studies demonstrate that ammonia emissions from CAFOs decrease personal comfort as well as social and economic well-being, ammonia meets the CAA definition of a pollutant which can reasonably be anticipated to endanger public welfare.

ii. Ammonia emissions re-deposit, polluting waterways and acidifying soils

The CAA definition of welfare impacts specifically includes impacts to water, vegetation, and soil. CAA § 302(h). Ammonia emissions have far-reaching environmental impacts, and affect public welfare by polluting water and land as well as air. While transport distances vary based on numerous environmental and climate factors, airborne ammonia eventually leaves the atmosphere, either as ammonia or after conversion to ammonium aerosol particles, through the processes of either dry or wet deposition.[183] Dry deposition occurs when the ammonia falls to earth without the presence of precipitation, while wet deposition occurs when ammonia returns

[180] *Id*. at 150.
[181] *Id*. at 148, *quoting* MacCannell D. Industrial agriculture and rural community degradation. In Swanson LE, ed. Agriculture and community change in the U.S.: The Congressional research reports at 63 (pp. 15-75). Boulder, CO: Westview Press (1988). *See also* Pew Commission Report at 42-43.
[182] Iowa Study at 148.
[183] U.S. Department of the Interior, U.S. Geological Survey (USGS), *Atmospheric Deposition Program of the U.S. Geological Survey: Fact Sheet FS-112-00 p. 1-6*, (December 2000) at 1, *available at* http://bqs.usgs.gov/AcidRain/program.pdf [hereinafter USGS Fact Sheet] (last visited Mar. 18, 2011).

to the earth via rain, snow, sleet, or fog.[184] This deposition can add nitrogen directly to waterways, or can add nitrogen to land areas, acidifying soils and ultimately adding to water pollution through surface runoff.

Ammonia gas emissions have a typical transport time ranging from one to five days.[185] Because "[p]recipitation readily removes most reactive nitrogen compounds, such as ammonia and nitrogen oxides, from the atmosphere,"[186] a significant percentage of volatilized ammonia can re-deposit within these first few days. Ammonia that converts to ammonium aerosol particles rather than depositing directly has a much longer average transport time, ranging from one to fifteen days.[187] As a result, the rate of conversion from ammonia gas to ammonium aerosol particles will significantly affect deposition patterns, as ammonium aerosols may travel thousands of kilometers before re-depositing.[188]

Additional factors also affect ammonia conversion, transport and deposition – including the prevalence of NO_x and SO_2 in the atmosphere, temperature, and precipitation patterns – making models and predictions of ammonia deposition impacts extremely complex.[189] However, existing research demonstrates that ammonia emissions, particularly in areas with high concentrations of CAFOs, can have severe local and regional effects on water quality. Watersheds in regions with numerous sources of ammonia emissions, such as the Chesapeake Bay, North Carolina, and the Mississippi River Corridor, receive high levels of overall nitrogen and ammonium deposition.[190]

When ammonia re-deposits into surface water, it endangers public welfare by polluting the water with excess nitrogen. The eutrophication process occurs when excess nutrients, in this case nitrogen in ammonia, enter surface water, thereby upsetting the nutrient balance of the waterway and contributing to increased algal growth.[191] Due to the nutrient overload in the water, algae initially flourish, but as these algae die off, the decomposition process depletes the water of its oxygen content.[192] Extreme cases of eutrophication lead to hypoxic "dead zones," such as the more than 15,000 square kilometer area in the Gulf of Mexico devoid of aquatic life.[193] Due in large part to increased nutrient loads from changed agricultural practices in the

[184] USGS Fact Sheet at 1.
[185] Viney P. Aneja et al., *Ammonia Assessment from Agriculture: U.S. Status and Needs*, 37 Envtl. Quality, 2008, at 516 [hereinafter Aneja].
[186] USGS Fact Sheet at 2.
[187] Aneja at 516.
[188] Aneja at 515-16.
[189] *See generally* Pinder, *supra* note 163.
[190] USGS Fact Sheet at 3, *see* Figure 5; *See also* National Atmospheric Deposition Program, 2009 ammonium ion wet deposition map, http://nadp.sws.uiuc.edu/ (last visited Mar. 18, 2011).
[191] USGS Fact Sheet at 2.
[192] *Id*.
[193] Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, *Moving Forward on Gulf Hypoxia Annual Report 2009*, 4 (2009), *available at* http://www.epa.gov/msbasin/implementation.htm (last visited Mar. 18, 2011).

Mississippi River watershed over the past 50 years, this dead zone is currently the largest in the U.S. and the second largest in the world.[194]

Though all sources of nitrogen and other nutrients contribute to eutrophication of waterways, in some watersheds, nitrogen deposition comprises a significant fraction of the total nitrogen load. One study of nutrient pollution sources found that coastal areas that export large amounts of nitrogen via water received 18 percent of that nitrogen from deposition – even more than the 15 percent from livestock waste runoff.[195] In the Chesapeake Bay, one of the United States" most recreationally, culturally, and economically significant water bodies, EPA has estimated that more than a third of the total nitrogen pollution entering the Bay comes from air deposition.[196] Areas with the highest concentrations of CAFOs see even greater impacts from nitrogen deposition; for example, research indicates that "[a]tmospheric deposition of nitrogen compounds may contribute as much as 35 to 60% of total nitrogen loading to North Carolina coastal waters."[197]

Re-deposited airborne ammonia also comprises a significant fraction of total nitrogen deposition in areas with ammonia emission sources; studies demonstrate that ammonia sources significantly affect overall nitrogen deposition on a local and regional scale. Pinder et al. used EPA"s Community Multiscale Air Quality (CMAQ) chemical transport model to map nitrogen deposition, and found that total nitrogen deposition near ammonia sources increases 10 to 40 percent.[198] Another study collected precipitation and measured its ammonium concentration, then used regression modeling to analyze the impact of ammonia sources on regional deposition.[199] The researchers found that areas with densely grouped CAFOs "will have a local impact" on both ammonia and ammonium aerosol deposition, and "may have a regional influence" on ammonium deposition. [200] The study found that CAFO emissions caused increases in ammonium deposition as far as 80 kilometers away.[201]

Despite an atypically small dead zone in 2009, the most recent five-year average size of the Gulf dead zone was 15,650 square kilometers. *Id*.

[194] EPA, *Hypoxia in the Northern Gulf of Mexico, an Update by the EPA Science Advisory Board*, EPA-SAB-08-003, 10-12 (Dec. 2007), available at: http://yosemite.epa.gov/sab/SABPRODUCT.NSF/C3D2F27094E03F90852573B800601D93/$File/EPA-SAB-08-003complete.unsigned.pdf (last visited Mar. 18, 2011).

[195] Robert W. Howarth et al., *Sources of Nutrient Pollution to Coastal Waters in the United States: Implications for Achieving Coastal Water Quality Goals*, 25 Estuaries 656, 668 (Aug. 2002) [hereinafter Sources of Nutrient Pollution].

[196] EPA, Office of Enforcement and Compliance Assurance, Chesapeake Bay Compliance and Enforcement Strategy at 2 (May 2010) [hereinafter Chesapeake Enforcement Strategy], *available at* http://www.epa.gov/oecaerth/civil/initiatives/chesapeake-strategy-enforcement.pdf (last visited Mar. 18, 2011).

[197] Aneja at 517.

[198] Pinder at 1.

[199] John T. Walker et al., *Atmospheric Transport and Wet Deposition of Ammonium in North Carolina*, 34 Atmospheric Env"t., 2000.

[200] *Id*. at 3408.

[201] *Id*. at 3416.

The National Atmospheric Deposition Program‟s data lend support to these findings, showing that ammonium deposition has been heavily concentrated in the livestock-intensive Upper Midwest over the past decade and is increasing in concentration in the region.[202] EPA‟s own findings in the Chesapeake Bay also show the regional influence of ammonia on Bay water quality. Despite the thousands of point sources discharging nitrogen directly to the Bay via surface waters, the agency‟s Office of Enforcement and Compliance Assurance (OECA) has recently estimated that six percent of the total nitrogen loadings in the Bay come from deposition of emissions from livestock manure and fertilized soil.[203]

Moreover, the results of the CMAQ modeling study suggest that increased regulation of NO_x and SO_2 will increase both ambient ammonia concentrations and localized nitrogen deposition near ammonia sources in the future. Increased CAA controls on NO_x and SO_2 will reduce ambient levels of these pollutants, which will reduce conversion of ammonia into ammonium aerosols that have greater transport potential.[204] Ammonia emissions are also expected to rise due to projected increases in livestock production and concentration. As a result of both factors, more ammonia will re-deposit within a shorter distance from emissions sources.[205] Specifically, the modeling indicated that "the total nitrogen deposition decreases in the future, except near ammonia emission sources. The largest future increases in total nitrogen deposition can be found in and around areas of high ammonia emissions, including the Delmarva Peninsula, eastern North Carolina, and northeastern Georgia."[206]

Additional studies have linked those areas where ammonia deposition plays a significant role in nitrogen loadings with areas near intensive animal production,[207] indicating again that much volatilized ammonia re-deposits within a small range of its source and has a considerable effect on water quality. Moreover, it is not only animal numbers and proximity, but also livestock production methods, that affect nitrogen deposition; the use of CAFO livestock production systems increases the total amount of ammonia volatilized from livestock, and therefore the amount that eventually re-deposits in waterways. Nutrient researchers have found that keeping cows on pasture, as opposed to in barns, reduces volatilization of ammonia by more than half.[208] These studies indicate that protecting water quality from nutrient pollution requires EPA to consider and regulate ammonia emissions from CAFOs.

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[202] National Atmospheric Deposition Program, Map Viewer, http://nadp.sws.uiuc.edu/maps/ (view Network: NTN, Map Type: Deposition, Analyte: NH_4) (last visited Mar. 18, 2011).
[203] Chesapeake Enforcement Strategy at 9. An additional 17 percent of the Bay‟s total nitrogen load comes from animal manure directly via water. *Id*.
[204] Pinder at 1.
[205] *Id*. at 3.
[206] *Id*. at 4.
[207] Donald F. Boesch, *Challenges and Opportunities for Science in Reducing Nutrient Over-enrichment of Coastal Ecosystems*, 25 American Scientist 896 (Aug. 2002).
[208] Sources of Nutrient Pollution at 663.

Ammonia deposition onto land also degrades soil quality. According to the National Atmospheric Deposition Program, "[w]hen an ammonium ion deposits to a soil surface, it can increase soil acidity through nitrification reactions, releasing hydrogen ions and converting ammonium to nitrate."[209] Acidified soil provides poor growing conditions for vegetation by depleting calcium and other nutrients from the soil, mobilizing inorganic aluminum, and increasing the accumulation of nitrogen and sulfur in the soil.[210] High levels of aluminum can be toxic to plants, fish, and other organisms.[211] In addition, when nitrogen deposits onto soil it benefits species that need a large supply of nitrogen, resulting in these species overtaking those adapted to a limited nitrogen supply.[212] Thus nutrient enrichment can degrade terrestrial ecosystems just as eutrophication devastates aquatic ecosystems. Recent studies suggest that acidic deposition has played a part in the decrease in tree species such as red spruce and sugar maple in the eastern United States.[213]

In accordance with the CAA's broad mandate to protect against threats to public welfare, this petition requests that EPA consider the entire nitrogen cycle when regulating ammonia. Public welfare encompasses the social benefits derived from protecting clean water, healthy and productive soils, natural vegetation, and the enjoyment of natural resources. Ammonia deposition significantly degrades water quality, and in doing so diminishes use, enjoyment, and economic value of surface waters for fishing, recreation, and municipal use. Ammonia deposition also harms soil quality, which lowers cropland productivity as well as the diversity, health, and recreational value of forest ecosystems. Regulating ammonia as a criteria pollutant would reduce total ammonia air emissions and the resulting deposition of ammonia into surface waters in the most polluted areas. Adequate regulation through the implementation of protective secondary NAAQS would benefit both air and water quality, thereby furthering EPA's mission to protect public welfare from air pollution.

iii. Ambient ammonia reduces property values

Ammonia emissions also harm public welfare by causing damage to and deterioration of property and economic values. CAA § 302(h). Much of this harm to property value and rural economies stems from the quality of life issues already discussed. CAFOs may adversely affect quality of life and property value nearby in several ways, such as air pollution, water pollution, noise, dust, flies, and increased traffic. But as discussed previously, the Iowa Study found that

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[209] National Atmospheric Deposition Program, Passive Ammonia Monitoring Network http://nadp.sws.uiuc.edu/nh3Net/ (last visited Mar. 18, 2011).
[210] Driscoll, Charles, et. al. *Effects of acidic deposition on forest and aquatic ecosystems in New York State*. Environmental Pollution 123 (2003) 327–336 [hereinafter Driscoll], *available at* http://www.esf.edu/hss/HF%20Ref%20PDF/EvnPol.123.327.336.pdf (last visited Mar. 18, 2011).
[211] *Id.*
[212] Dep't of Environment, Food & Rural Affairs, *Ammonia in the UK* 25 (2002), *available at* http://www.defra.gov.uk/environment/quality/air/airquality/publications/ammonia/documents/ammonia-in-uk.pdf (last visited Mar. 18, 2011).
[213] Driscoll at 327–336.

citizens near CAFOs have identified odor and air pollution as the leading CAFO nuisances contributing to decreased quality of life.[214] In many rural communities, homeowners living near CAFOs find themselves unable to sell their homes and relocate because CAFO air pollution, including ammonia emissions, makes their home undesirable, thereby dramatically lowering its market value. Both case law and academic research reflect a growing acceptance of the fact that CAFOs have an adverse economic impact on nearby residences. Odor and air pollution have a negative effect on quality of life, and therefore significantly affect the amount a buyer will be willing to pay.

In one recent case, *Darnall Ranch, Inc. v. Banner County Board of Equalization*, the Supreme Court of Nebraska held that the state tax board acted unreasonably and arbitrarily in failing to adjust Darnall"s home value downward due to its proximity to a large cattle feedlot.[215] Discussing a prior hog CAFO case, the Court stated plainly that "[n]o reasonable fact finder could conclude that in the real estate marketplace, a potential buyer would not notice, and react economically, to having a large hog facility very nearby while living in a remote location."[216] In 2002, an Iowa District Court similarly held that the construction of a large hog CAFO reduced one neighbor"s property value by $50,000, and awarded $100,000 in damages.[217]

Economic studies have also found that CAFOs reduce the value of nearby property. One Missouri study found that every Missouri CAFO lowered surrounding property values by approximately *$2.68 million*.[218] This translated to an average value loss of 6.6 percent within a three-mile radius, and an average value loss of more than 88 percent for those properties within a quarter mile of the CAFO.[219] The Union of Concerned Scientists roughly extrapolated this finding, concluding that if every CAFO had a similar impact, CAFOs cost the United States as much as *$26 billion* in lowered property values.[220]

The Appraisal Journal has also addressed how CAFOs impact property values; a 2001 article on the issue advised that appraisers should consider the effects of nearby CAFOs on use and enjoyment of property when evaluating rural homes. The author reviewed published research and several case studies on the effects of CAFOs on property value, concluding that "diminished marketability, loss of use and enjoyment, and loss of exclusivity can result in a

[214] Iowa Study at 149-50.
[215] *Darnall Ranch, Inc. v. Banner Co. Bd. of Equal.*, 753 N.W.2d 819 (Neb. 2008).
[216] *Id*. at 831, quoting *Livingston v. Jefferson Cty. Bd. of Equal.*, 640 N.W.2d 426 at 437 (2002).
[217] *Judge awards Iowa couple $100,000 in hog lot lawsuit*, AMARILLO GLOBE NEWS, Jan. 12, 2002, *available at* http://www.pmac.net/AM/hoglot_lawsuit.html (last visited Mar. 18, 2011). For additional cases finding devaluation of property from nearby CAFOs, *see* http://www.factoryfarmtaxprotest.org/cases.htm.
[218] Mubarak, H., T.G. Johnson, and K.K. Miller. 1999. *The impacts of animal feeding operations on rural land values*. Report R-99-02. College of Agriculture, Food and Natural Resources, University of Missouri–Columbia.
[219] *Id*.
[220] Union of Concerned Scientists, *CAFOs Uncovered: The Untold Costs of Confined Animal Feeding Operations* (April 2008) at 5.

diminishment ranging from 50% to nearly 90% of otherwise unimpaired value."[221] A Pennsylvania study has since found that the prices of homes adjacent to CAFOs decrease once the total live weight of confined animals exceeds 200,000 pounds.[222]

A community located in Princess Anne, Maryland puts property value impacts into perspective. As has happened in rural communities throughout the U.S., homeowners purchased houses on a rural residential street, and large poultry CAFOs subsequently moved in and surrounded the homes at close proximity. As this photograph shows, formerly desirable homes are now, among other things, exposed to ammonia pollution from all directions.[223] Common sense dictates that such a community transformation, with accompanying air and water pollution, traffic, dust, noise, and flies, will affect the price any potential buyer would be willing to pay. CAFO air pollution, including ammonia, plays a central role in decreased property values, thereby harming public welfare.

Princess Ann, Maryland, February 5, 2009

[221] J.A. Kilpatrick, *Concentrated Animal Feeding Operations and Proximate Property Values*, 39 The Appraisal J. 3 (2001) at 306.
[222] R.C. Ready and C.W. Abdalla, *The Amenity and Disamenity Impacts of Agriculture: Estimates from a Hedonic Pricing Model*, 87 Am. J. of Agric. Econ. 2 (2005) at 314-326.
[223] Princess Anne, MD on February 5, 2009, photograph from the Assateague Coastal Trust and the Assateague COASTKEEPER.

iv. Ambient ammonia impairs visibility in pristine areas

Ammonia emissions also harm public welfare by impairing visibility and damaging property and economic values in scenic areas. EPA has assessed the impact of air pollution on visibility, finding that "[i]n our nation's scenic areas, the visual range has been substantially reduced by air pollution. In eastern parks, average visual range has decreased from 90 miles to 15-25 miles. In the West, visual range has decreased from 140 miles to 35-90 miles."[224] Ammonia has significantly contributed to this damage. Emissions research has established that the reactive nitrogen in ammonia "has a variety of environmental consequences including acidification and eutrophication, photo-chemical air pollution [and] reduced visibility.[225] As discussed, ammonia gas reacts with nitrous oxides and sulfur dioxide to form small aerosol particles harmful to human health; these same light-scattering aerosol particles do further damage by forming the regional haze that limits visibility in many of the nation's scenic and wild places.[226]

For example, the Oregon Department of Environmental Quality has identified ammonia emissions – specifically emissions from the region's dairy CAFOs – as a significant contributor to regional haze and impaired visibility in the Columbia Gorge National Scenic Area.[227] State officials also recognize that ammonia's contribution to acid rain in the Gorge threatens cultural and natural resources.[228] EPA must consider these impacts when assessing ammonia's effects on public welfare, and should establish secondary NAAQS that will protect visibility in wilderness and culturally significant areas for enjoyment by all Americans.

C. Ammonia in the ambient air results from numerous stationary sources

To qualify for listing as a criteria pollutant, ammonia must exist in the air as a result of "numerous or diverse mobile or stationary sources." CAA § 108(a)(1)(B). Ammonia meets these threshold requirements, because CAFOs qualify as stationary sources, and numerous CAFOs emit ammonia into the ambient air.

1. CAFOs are stationary sources

Section 302(z) of the CAA defines stationary sources broadly, stating "[t]he term "stationary source" means generally any source of an air pollutant except those emissions

[224] EPA, Visibility: Basic Information, *available at* http://epa.gov/oar/visibility/what.html (last visited Mar. 18, 2011).
[225] Aneja at 517.
[226] Or. Dep't of Envtl. Quality, Fact Sheet: Columbia Gorge Air Quality Strategy Report (2008), *available at* http://www.deq.state.or.us/aq/factsheets/08aq002_gorge.pdf (last visited Mar. 18, 2011).
[227] *Id*.
[228] *Id*.

resulting directly from an internal combustion engine for transportation purposes or from a nonroad engine or nonroad vehicle as defined in section 7550 of this title."

CAFOs clearly meet the definition of stationary source: they emit ammonia, an air pollutant, into the air and are not internal combustion engines, nonroad engines, or nonroad vehicles. Under the statute, "any" other source of an air pollutant qualifies as a stationary source. Thus, the CAA's broad language indicates that the law does not limit the term "stationary source" to any particular sector, and CAFOs qualify as stationary sources under CAA § 302(z).

2. CAFOs are numerous

Many thousands of CAFOs contribute to air pollution throughout the United States. Though the CAA does not set a threshold number for "numerous" sources and case law does little to clarify this standard,[229] these facilities exist in thousands of rural communities throughout the U.S., and do not only affect a small area or specific group of people. EPA's Final CAFO Rule identified an estimated total of 20,685 CAFOs nationwide in 2008.[230] In contrast, EPA regulates SO_2 as a criteria pollutant, 73 percent of which comes from the nation's 5,400 power plants.[231] Under any consistent interpretation of the term, CAFOs are numerous and therefore meet the CAA "numerous or diverse sources" requirement for stationary sources of designated criteria pollutants.

D. EPA has not yet issued air quality criteria for ammonia

Ammonia also satisfies the final CAA § 108(1)(C) requirement for listing as a criteria pollutant because EPA has not yet issued air quality criteria for the pollutant and did not do so before December 31, 1970.[232]

Ammonia therefore meets all of the legal requirements for listing under §108 of the CAA: ammonia is a pollutant as defined by the CAA, emissions of which cause or contribute to air pollution which may reasonably be anticipated to endanger both public health and public

[229] In *NRDC v. Train*, 545 F.2d 320 (2nd Cir. 1976), EPA conceded that lead-emitting automobiles were "numerous or diverse mobile or stationary sources," and thus the court did not have to address the issue and did not set a threshold for numerous sources. *Id*. at 324. No other case petitioners are aware of clarifies the requirement that sources be numerous.

[230] Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines for Concentrated Animal Feeding Operations in Response to the Waterkeeper Decision: Final Rule, 40 C.F.R. Parts 9, 122, 412 (2008); 73 Fed. Reg. 70418 at 70469-70470.

[231] EPA, Fact Sheet: Revisions to the National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide, *available at* http://www.epa.gov/air/sulfurdioxide/pdfs/20100602fs.pdf (last visited Mar. 18, 2011); U.S. Energy Information Administration, Frequently Asked Questions, http://www.eia.doe.gov/ask/electricity_faqs.asp#coal_plants (last updated Jan. 24, 2011).

[232] As discussed *infra* Section VII, an EPA "plan" to issue air quality criteria for a pollutant is not a requirement for listing; once EPA makes findings under CAA § 108(a)(1)(A) and (B), listing becomes mandatory.

welfare, the emissions are present in the ambient air as the result of numerous stationary sources, including CAFOs, and EPA has yet to issue air quality criteria for ammonia.

VI. EPA CURRENTLY REGULATES SIMILAR EXPOSURES UNDER THE NAAQS PROGRAM

EPA"s existing NAAQS already regulate sulfur dioxide (SO_2), a criteria pollutant with characteristics similar to ammonia, and which requires standards similar to those that are necessary to protect public health and welfare from ammonia pollution. As with brief exposures to SO_2, acute ammonia exposures pose a public health threat. And similar to SO_2, which EPA has found does not affect the entire U.S. public but rather impacts pockets of the population near major sources, ammonia emissions primarily impact geographically discrete rural communities throughout the U.S.

EPA has regulated SO_2 as a criteria pollutant since 1971.[233] To protect public health from exposure to SO_2 emitted by power plants and industrial facilities, EPA initially set a 24-hour standard of 140 ppb and a one-year standard of 30 ppb.[234] However, subsequent research on the health effects of SO_2 led EPA to determine that short-term exposures – between 5 minutes and 24 hours – pose the most significant health threats, and therefore primary NAAQS should protect health from short-term spikes in SO_2 concentrations. These acute SO_2 exposures can worsen asthma symptoms and cause respiratory effects such as narrowing of the airways.[235] To better protect vulnerable citizens from short-term SO_2 exposures, EPA recently revoked both the 24-hour and the one-year primary NAAQS and replaced them with a one-hour primary NAAQS of 75 ppb.[236]

EPA"s new one-hour SO_2 NAAQS reflects a growing understanding of the acute risks posed by certain toxic emissions, and provides the necessary framework to similarly regulate ammonia. EPA"s own ammonia AEGLs document the risks of acute ammonia exposures; the agency"s research reports the potential for adverse health effects at concentrations of 30 ppm after as few as 10 minutes.[237] Moreover, EPA"s NAEMS data show that ammonia emissions from CAFOs fluctuate significantly, exposing nearby residents to short-term spikes in ammonia concentrations that exceed both levels and durations of concern.[238] EPA should evaluate available ammonia emissions data, considering both existing health-based exposure standards and heightened health effects of mixed-pollutant exposures, and establish a standard that will protect the public from the acute ammonia health effects it determines are likely to occur near

[233] Primary National Ambient Air Quality Standard for Sulfur Dioxide; Final Rule, 75 Fed. Reg. 35,520 at 35,522 (June 22, 2010) [hereinafter Primary SO_2 NAAQS].
[234] Primary SO_2 NAAQS at 35,521, 35,524.
[235] EPA, Fact Sheet: Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide, 2, *available at* http://www.epa.gov/air/sulfurdioxide/pdfs/20100602fs.pdf.
[236] Primary SO_2 NAAQS at 35,520.
[237] EPA, Ammonia Acute Exposure Guideline Levels, http://www.epa.gov/opptintr/aegl/pubs/results88.htm.
[238] *See* discussion of EPA"s NAEMS data, *supra* Section V.B.1.iii.b.

CAFOs. In addition, because much of the existing research on ambient ammonia levels near CAFOs involves time-averaged data, EPA should consider the fact that spikes in ambient ammonia levels have not been thoroughly documented when establishing an adequate margin of safety in its standards.

EPA"s SO_2 rulemaking also sets a precedent for regulating pollutants whose health effects are significant, but not ubiquitous. The new standard resulted from a challenge to the agency"s 1997 decision not to modify the SO_2 NAAQS, despite its finding that short-term exposures below the previous standards posed a health threat to asthmatics. EPA had determined that a more stringent five-minute health standard was not necessary when it considered SO_2 "from a national perspective," finding that the health threat was not adequately ubiquitous and the likelihood that a susceptible individual would suffer adverse health effects was low.[239] The American Lung Association and the Environmental Defense Fund successfully challenged this decision in the District of Columbia Circuit, which held that "nothing in the Final Decision explains away the possibility that „localized," „site-specific," or even „infrequent" events might nevertheless create a public health problem, particularly since, in some sense, all pollution is local and site-specific…."[240]

EPA should apply this analysis to ammonia, which primarily affects rural residents near CAFOs. While ambient ammonia levels likely do not pose a significant health threat in most urban areas, and therefore may not affect the majority of the public, the D.C. Circuit made clear that even localized, site-specific, and infrequent ambient air pollution may create a public health risk that meets the standard in § 108 and therefore requires CAA regulation. In its final SO_2 rule, EPA further pointed out that "in selecting primary standards that include an adequate margin of safety, the Administrator is seeking not only to prevent pollution levels that have been demonstrated to be harmful but also to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree."[241] EPA should adopt the same cautious approach regulating ambient ammonia, the adverse health effects of which have been documented but which has not been rigorously studied by EPA, particularly in combination with other air pollutants. And as with the SO_2 rule, EPA should require ambient air monitoring for ammonia in areas with an "increased coincidence of people and [ammonia] emissions."[242]

[239] *Id*. at 35,522.
[240] *Id*. at 35,523, quoting *American Lung Ass'n v. EPA*, 134 F.3d 388, 392 (D.C. Cir. 1998).
[241] *Id*. at 35,521.
[242] *Id*.

VII. EPA SHOULD CONSIDER ENVIRONMENTAL JUSTICE CONCERNS WHEN DECIDING WHETHER TO REGULATE AMMONIA

EPA must consider environmental justice concerns regarding ammonia emissions when deciding whether to regulate ammonia. Executive Order 12,898 directs all agencies to consider environmental justice concerns during the decision-making process.[243] EPA has acted to effectively implement this Order through its recently issued Interim Guidance regarding environmental justice.[244] The Interim Guidance sets out two primary environmental justice concerns for the agency: ensuring fair treatment and enabling meaningful involvement of those impacted by EPA actions.[245] Fair treatment requires that "no group of people should bear a disproportionate burden of harms and risks," including the "negative environmental consequences" of governmental policies.[246] To achieve meaningful involvement by impacted communities, those potentially affected must have an appropriate role in decisions that may affect their environment or health.[247] Simply permitting input does not satisfy this obligation; EPA decision-makers have committed to actively "seek out and facilitate the involvement of those potentially affected."[248]

EPA's decision whether to regulate ammonia from factory farms involves an environmental justice concern, because certain communities are disproportionately impacted by the pollution from these operations and have been excluded from meaningful participation in decisions regarding their siting and regulation. In addition, EPA's response to this petition will constitute an "action that involves an environmental justice concern," because it "present[s] opportunities to address existing disproportionate impacts on minority, low-income, or indigenous populations that are addressable through the action."[249] CAFO ammonia pollution implicates nearly all of the primary factors EPA's Interim Guidance identifies as consideration factors for decision-making processes: (1) proximity and exposure to environmental hazards, (2) susceptible populations, (3) unique exposure pathways, (4) multiple and cumulative effects, and (5) ability to participate in the decision-making process.[250] As discussed throughout this petition, CAFOs are the largest source of ammonia emissions in the US, and thus the environmental justice analysis EPA conducts when reviewing this petition must address communities impacted by CAFO air pollution.

[243] Exec. Order 12,898 (1994).
[244] EPA, EPA's Action Development Process: Interim Guidance on Considering Environmental Justice During the Development of an Action (July 2010).
[245] *Id*. at 3.
[246] *Id*.
[247] *Id*.
[248] *Id*.
[249] *Id*. at 6.
[250] *Id*. at 7-8.

Peer-reviewed sociological studies have shown that CAFOs are disproportionately located in communities with low socioeconomic status and frequently in predominantly African-American communities. One 2006 study of seventh and eighth grade students in North Carolina found an association between economic disadvantage and "proximity to the nearest hog CAFO and with strength of the odor."[251] The study found two other troubling correlations: populations already vulnerable to asthma and other illnesses are more likely to be exposed to CAFO emissions such as ammonia,[252] and schools with a high non-white population and a low socioeconomic status were more likely than other schools to have hog CAFOs nearby.[253] A 2011 study of 16 North Carolina communities concluded that in general, "[i]ndustrial hog operations in North Carolina are disproportionately located in low-income communities of color."[254]

Another study looked at placement and expansion of large hog CAFOs in 17 states, including three states where large-scale production had been rapidly expanding: North Carolina, Iowa, and Minnesota. In these three states, the researchers found disproportionate siting and expansion of large hog CAFOs in African-American communities in the 1980s and 1990s, and concluded that as hog production shifts from small-scale to large-scale, racial inequity in CAFO siting intensifies.[255]

Yet another study investigated hog CAFO siting in Mississippi, looking both state-wide and specifically in the counties with hog production, to determine whether hog CAFOs sited disproportionately in areas with higher poverty or higher percentages of African-American residents.[256] The study found three times as many hog CAFOs in (1) high African-American, low poverty and (2) high poverty, low African-American communities as compared to a control.[257]

EPA should consider the combined effects of the increasing geographic concentration of CAFOs, the adverse effect CAFOs have on nearby property values, and the disproportionate siting of CAFOs in low-income and minority communities when assessing the environmental justice impact of CAFO ammonia emissions. These factors exacerbate existing inequity, as low-income residents who already have the lowest mobility will become even less able to escape pollution as property values decline and more CAFOs move into an area. Citizens who live close to CAFOs and who breathe ammonia pollution every day frequently will not have the

[251] Maria C. Mirabelli, Steve Wing, Stephen W. Marshall & Timothy C. Wilcosky, *Race, Poverty, and Potential Exposure of Middle-School Students to Air-Emissions from Confined Swine Feeding Operations* 114 Envtl. Health Persp. 591, 593 (April 2006).
[252] *Id*. at 591, 594.
[253] *Id*. at 595.
[254] Schinasi, *supra* note 109 at 7.
[255] Jeremy Arney, Janice E. Johnston, & Paul B. Stretesky, *Environmental Inequity: An Analysis of Large-Scale Hog Operations in 17 States, 1982-1997* 68 Rural Sociology 231, 244 (2003).
[256] Sacoby M. Wilson, et al., *Environmental Injustice and the Mississippi Hog Industry*, 110 Envt'l Health Perspectives 2 (April 2002).
[257] *Id*. at 199.

means to uproot their lives and families to move to a safer, less polluted community – nor should they have to.

The petitioners request that EPA recognize the environmental justice issues that underlie regulation of ammonia and make environmental justice a primary goal when determining whether to regulate it. This consideration should involve targeted outreach to communities near large or numerous CAFOs and active solicitation of public input from these stakeholders. EPA should base its determination of what constitutes protective regulation and fair treatment on the most adversely impacted communities and the most susceptible individuals, rather than simply assessing average ammonia concentrations in all rural communities.

VIII. EPA HAS A DUTY TO MAKE AN ENDANGERMENT FINDING AND REGULATE AMMONIA

In *Massachusetts v. EPA*,[258] the Supreme Court clarified EPA's obligations to make endangerment findings for air pollutants under the CAA.[259] In its discussion of EPA's discretion to determine, in the administrator's judgment, whether to make an endangerment finding for an air pollutant, the Court noted that "the use of the word "judgment" is not a roving license to ignore the statutory text." Rather, the exercise of this judgment "must relate to whether an air pollutant 'cause[s], or contribute[s] to, air pollution which may reasonably be anticipated to endanger public health or welfare.'"[260] When EPA issues its response to a petition for rulemaking "its reasons for action or inaction must conform to the [CAA]," and EPA can only decline to act if it either finds that no endangerment exists or "provides some reasonable explanation as to why it cannot or will not exercise its discretion" to make an endangerment finding one way or another.[261]

Ammonia is a known and extensively researched toxin, for which "sufficient information exists to make an endangerment finding."[262] EPA and other federal agencies, as well as numerous peer-reviewed studies, have extensively documented ammonia's adverse health and welfare impacts, and EPA lacks the requisite "scientific uncertainty…so profound that it precludes EPA from making a reasoned judgment"[263] as to endangerment. Similarly, EPA lacks reasonable grounds on which to make a finding that ammonia does not endanger public health or

[258] *Massachusetts v. EPA*, 549 U.S. 497 (2007).
[259] Though the Court addressed the endangerment language in § 202(a), emissions standards for new motor vehicles, the language is substantially identical to the endangerment language in § 108(a). The Court's reasoning relied on the plain language of the statute, and therefore also applies to endangerment findings under § 108(a). EPA has not interpreted these provisions as having significantly different meanings, and thus the "normal rule of statutory construction that identical words used in different parts of the same act are intended to have the same meaning" applies. *Gustafson v. Alloyd Co., Inc.*, 513 U.S. 561, 569 (1995) (internal quotation marks and citations omitted).
[260] *Mass v. EPA* at 532-33.
[261] *Id*. at 533.
[262] *Id*. at 534.
[263] *Id*.

welfare. Consequently, a failure to initiate a rulemaking that proposes an endangerment finding for ammonia would be arbitrary and capricious.

If EPA makes an endangerment finding for ammonia, the finding will trigger a mandatory duty to list ammonia as a criteria pollutant. CAA § 108(a)(1) requires that the EPA Administrator "shall" list pollutants that meet the previously discussed requirements of (A) and (B), and "for which air quality criteria had not been issued before December 31, 1970, but for which [s]he plans to issue air quality criteria under this section." CAA § 108(a)(1)(C). In *NRDC v. Train*, the Second Circuit clarified that the latter provision of part (C) does not give EPA discretion to choose not to list a pollutant for which it made an endangerment finding because it has no "plans" to do so.[264] Rather, the court found conclusively that "[o]nce the conditions of §§ 108(a)(1)(A) and (B) have been met, the listing of [the pollutant] and the issuance of air quality standards for [the pollutant] become mandatory."[265]

Because ammonia meets the legal requirements above, the petitioners request that EPA review the scientific data regarding ammonia, make an endangerment finding, and determine that it must list ammonia as a criteria pollutant. The petitioners further request that EPA then establish both primary and secondary NAAQS for ammonia under §109 of the CAA for the protection of public health and public welfare with an adequate margin of safety.

IX. CONCLUSION

This petition requests that EPA regulate ammonia as a criteria pollutant under the CAA. Ammonia meets all of the legal requirements for listing as a criteria pollutant, and numerous peer-reviewed studies show that ambient ammonia endangers both public health and public welfare. CAA § 109(d)(1) gives EPA authority to re-evaluate the criteria and promulgate new standards for pollutants at its discretion, provided it completes a thorough review every five years, and the petitioners respectfully request that EPA undertake a review of ammonia without delay. An unreasonable delay responding to this petition, an arbitrary and capricious denial of this petition, or a scientifically unsubstantiated failure to make an endangerment finding will subject EPA to judicial review under Administrative Procedure Act[266] (APA) § 706(1), APA § 706(2)(A), or CAA § 304(a)(2).

[264] *NRDC v. Train*, 545 F.2d 320 (2nd Cir. 1976).
[265] *Id*. at 328. EPA recently questioned this 34-year old precedent in its *Advanced Notice of Proposed Rulemaking: Regulating Greenhouse Gas Emissions Under the Clean Air Act*, 73 Fed. Reg. 44,354 at 44,477 FN 229 (2008). Although EPA has postulated that the subsequent establishment of *Chevron* deference could lead to a different outcome than under the NRDC court, that court used an analysis that would now clearly fall under *Chevron* "step 1," in finding that the statute"s plain language, structure, and legislative history "leave no room for interpretation" and impose a mandatory duty on EPA. *NRDC v. Train*, 545 F.2d at 328. Thus, an effort to overturn this precedent would likely fail.
[266] Administrative Procedure Act, 5 U.S.C. §§ 551-559; 701-706 (2006).

As previously discussed, the petitioners assert that the scientific record on ammonia"s threat to public health gives rise to an affirmative duty by EPA to make an endangerment finding and regulate ambient ammonia. Thus, the petitioners will deem a failure by EPA to make such a finding and initiate a rulemaking to designate ammonia as a criteria pollutant a "failure…to perform any act or duty…which is not discretionary," which is subject to judicial review under the citizen suit provision of the CAA. CAA § 304(a)(2).

The petitioners request that EPA respond to this petition in a timely manner by making an endangerment finding for ammonia and determining that it will regulate ammonia under CAA §§108 and 109 for the protection of public health and public welfare. The APA provides the petitioners with the right to petition EPA for a rulemaking to list ammonia as a criteria pollutant, and also obligates EPA to respond "with due regard for the convenience and necessity of the parties" and "within a reasonable time…proceed to conclude a matter presented to it." APA § 555(b). CAFOs have escaped regulation for their air emissions for decades, and rural citizens whose health have been and continue to be harmed by airborne ammonia require swift action by EPA. Therefore, in determining what constitutes a reasonable time for response to this petition, the petitioners urge EPA to consider that "human health and welfare are at stake."[267]

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[267] *See In Re. American Rivers & Idaho Rivers United, Petitioners*, 372 F.3d 413, 418 (D.C. Cir. 2004).

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Attachment B:

May 13, 2014 EPA Response to Freedom of Information Act Request EPA-HQ-2013-008469

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAY 13 2014

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Ms. Tarah Heinzen, Esq.
Environmental Integrity Project
One Thomas Circle, NW, Suite 900
Washington, D.C. 20005

RE: Freedom of Information Act Request EPA-HQ-2013-008469

Dear Ms. Heinzen:

Thank you for your July 22, 2013, Freedom of Information Act (FOIA) request (HQ-2013-008469). Your FOIA request contains seven parts that, in general, ask for records pertaining to the U.S. Environmental Protection Agency's (EPA or Agency) National Air Emissions Monitoring Study (NAEMS) and emissions estimating methodology (EEM) process for animal feeding operations (AFOs), as well as records related to two pending citizen petitions. One petition requests the Agency to regulate ammonia as a criteria pollutant under Clean Air Act (CAA) sections 108 and 109. The other petition requests the Agency to list concentrated AFOs under CAA section 111(b)(1)(A) and promulgate standards of performance under CAA sections 111(b)(1)(B) and 111(d).

Accompanying this letter are the records relevant to the two pending citizen petitions. The EPA continues to search and review our records and, if we find any additional records pertinent to these two petitions we will release those documents to you on a rolling basis. The EPA is still searching and compiling documents responsive to the NAEMS and EEM development process. Our goal is to submit the next group of documents by June 17, 2014. We will also inform you if our search finds no additional records.

You may appeal this response to the National Freedom of Information Officer, U.S. EPA, FOIA and Privacy Branch, 1200 Pennsylvania Avenue, N.W. (2822T), Washington, D.C. 20460 (U.S. Postal Service Only), Fax: (202) 566-2147, E-mail: hq.foia@epa.gov. Only items mailed through the United States Postal Service may be delivered to 1200 Pennsylvania Avenue, N.W. If you are submitting your appeal via hand delivery, courier service or overnight delivery, you must address your correspondence to 1301 Constitution Avenue, NW., Room 6416J, Washington, D.C. 20001. Your appeal must be made in writing, and it must be submitted no later than 30 calendar days from the date of this letter. The Agency will not consider appeals received after the 30 calendar day limit. The appeal letter should include the request FOIA request number listed above. For quickest possible handling, the appeal letter and its envelope should be marked "Freedom of Information Act Appeal."

Again, thank you for your request. I appreciate the opportunity to be of service and trust the information provided is helpful to you.

Sincerely,

Jennifer Noonan Edmonds

Jennifer Noonan Edmonds
Director
Policy Analysis and Communications Staff

Enclosures

EPA United States Environmental Protection Agency

EPA Updates for AAQTF Presentation

Washington D.C.
June 9, 2011

EPA United States Environmental Protection Agency

Topics

- PM NAAQS - Scott Jenkins
- Ozone NAAQS – Susan Stone
- PM Monitoring – Bob Vanderpool
- PM_{10} Outreach Sessions – Bill Harnett/Ally Mayer
- Solid Waste/Incineration Rules – Amy Hambrick
- Fire Policy – Bill Harnett/Larry Elmore
- NAEMS – Larry Elmore/Ally Mayer
- Black Carbon Report to Congress – Erika Sasser
- Biogenics/Biofuels for GHGs – Ally/Carole Cook
- Petitions – Ally Mayer
  - Listing Ammonia as Criteria Pollutant (Karen Martin)
  - Listing Hydrogen Sulfide as a HAP (Elineth Torres)
  - Listing CAFOs as a source category (Larry Elmore)

EPA United States Environmental Protection Agency

Ozone NAAQS Update

- Reconsideration of the 2008 Decision on the Ozone NAAQS
  - Proposal published in Federal Register
    - January 19, 2010, Volume 75, Number 11
  - Final decision expected end of July 2011

- Ozone NAAQS review initiated in 2008
  - CASAC Review of the Integrated Science Assessment and Scope and Methods Plan for Exposure and Risk Assessment occurred May 19-20, 2011
  - Schedule for review may be found in the Integrated Review Plan (p 2-2) at: http://www.epa.gov/ttn/naaqs/standards/ozone/data/2011_04_OzoneIRP.pdf

PM NAAQS Review Process to Date

- Current review initiated in 2007; includes review of primary (health-based) and secondary (welfare-based) standards for fine and coarse particles
- Review is thorough and extensive, with many opportunities for CASAC and public comment; final documents take into consideration CASAC and public comments on multiple draft documents
  - **Integrated Science Assessment:** final document issued December 2009
    - Synthesis and assessment of most policy-relevant science
  - **Risk/Exposure Assessments:** final documents issued June/July 2010
    - Quantitative Health Risk Assessment; Urban-Focused Visibility Assessment
    - Focus on fine particles and did not assess risks associated with coarse particles
  - **Policy Assessment:** final document issued April 2011
    - Staff conclusions address adequacy of current standards and potential alternative standards appropriate to consider
      - Discusses broadest range of policy options supported by the available scientific evidence, quantitative assessments, and air quality analyses

➢ All documents available at: http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html

EPA United States Environmental Protection Agency

Final Policy Assessment Conclusions and CASAC Advice

Primary (health-based) $PM_{2.5}$ Standards

- **Staff and CASAC** conclude it is appropriate to consider **revising** the standards to provide **increased public health protection**
- Consider **revising annual standard level** within a range of **13-11 µg/m³** (current standard is 15 µg/m³)
  - Staff concludes that evidence most strongly supports range of 12 -11 µg/m³
- Consider **retaining or revising 24-hour** standard level within a range of **35-30 µg/m³** (current standard is 35 µg/m³)

Primary (health-based) PM_{10} standards

- **Staff** concludes scientific evidence and associated uncertainties could provide support for **either retaining or revising** the current primary 24-hour PM_{10} standard (150 µg/m³)
  - To the extent consideration is given to revising the standard, staff concludes it would be appropriate to consider a 98th percentile form in conjunction with a level within a range of 85 to 65 µg/m³
- **CASAC** does not support retaining the current PM_{10} standard; **recommends revising** form and level in order to **increase public health protection**
  - CASAC recommends a 98th percentile form in conjunction with a level within a range of 75 to 65 µg/m³

Secondary (welfare-based) PM standards

- **Staff and CASAC** agree that it is appropriate to consider setting a distinct secondary $PM_{2.5}$ standard to address visibility impairment primarily in urban areas; considering options for structuring such a secondary standard distinct from the primary $PM_{2.5}$ standards, in terms of:
  - Alternative indicators, averaging times, and forms
  - Selecting alternative standard levels that reflect appropriate degree of public welfare protection

➢ **No decisions have been made at this time**

- EPA anticipates issuing a proposal for public review and comment later this year

EPA United States Environmental Protection Agency

PM Monitoring

- Will receive this slide by Friday from Bob Vanderpool

EPA United States Environmental Protection Agency

PM_{10} Outreach Meetings

- Schedule
  - February 17: Washington, D.C.
  - February 23: Kansas City (Region 6 &7 states)
  - February 25: Des Moines (Regions 5 & 7 states)
  - March 2: Riverside CA (Region 9 states)
  - March 9: Spokane (Region 10 states)
  - March 10: Denver (Region 8 states)
- Summary of Comments
  - Current PM10 standard should not be revised
  - If tighter standards are chosen, some farms will have to close
  - Stakeholders believe there are problems with the way EPA considers exceptional/natural events

EPA United States Environmental Protection Agency

Solid Waste Combustion and Incineration

- Federal Register
  - March 21, 2011, Volume 76 Number 54
    - CISWI rules
    - SSI rules
    - Area Source Industrial, Commercial and Institutional Boilers
    - Major Source Industrial, Commercial and Institutional Boilers
    - Non-Hazardous Solid Waste Definition
- Regulations
  - The definition of "solid waste" determines if a source will be subject to CAA sections 112 or 129 by identifying which materials are solid wastes when burned in combustion units
    - 112 – Boiler, Cement
    - 129 – CISWI, SSI, OSWI, HMIWI, MWC

EPA United States Environmental Protection Agency

CISWI/Boilers Reconsiderations

- Federal Register
  - March 21, 2011, Volume 76 Number 54
    - EPA announced it will voluntarily "reconsider" certain aspects of the CISWI and Boiler rules. SSI is not part of the reconsideration
  - Publication Pending: May 16, 2011 (signature)
    - EPA issued a "Stay" on the CISWI/Boilers final rules
- Basis of reconsideration
  - CISWI and Boilers reflect reasonable approaches consistent with the requirements of the CAA. However, some of the issues identified in the comments on our April 2010 proposal raised difficult technical issues that the Agency believes would benefit from additional public involvement
- EPA has also received multiple petitions from interested parties for reconsideration
  - These petitions identify specific items for EPA to reconsider
- Next Steps
  - EPA will issue a notice of proposed reconsideration of each rule that identifies specific issues or issues raised in the petitions which the Agency is granting reconsideration
    - EPA will consider any additional data or information submitted by the public
    - EPA requests that if the public does submit any additional data, it do so by July 15, 2011 to allow the Agency time to fully consider it

EPA United States Environmental Protection Agency

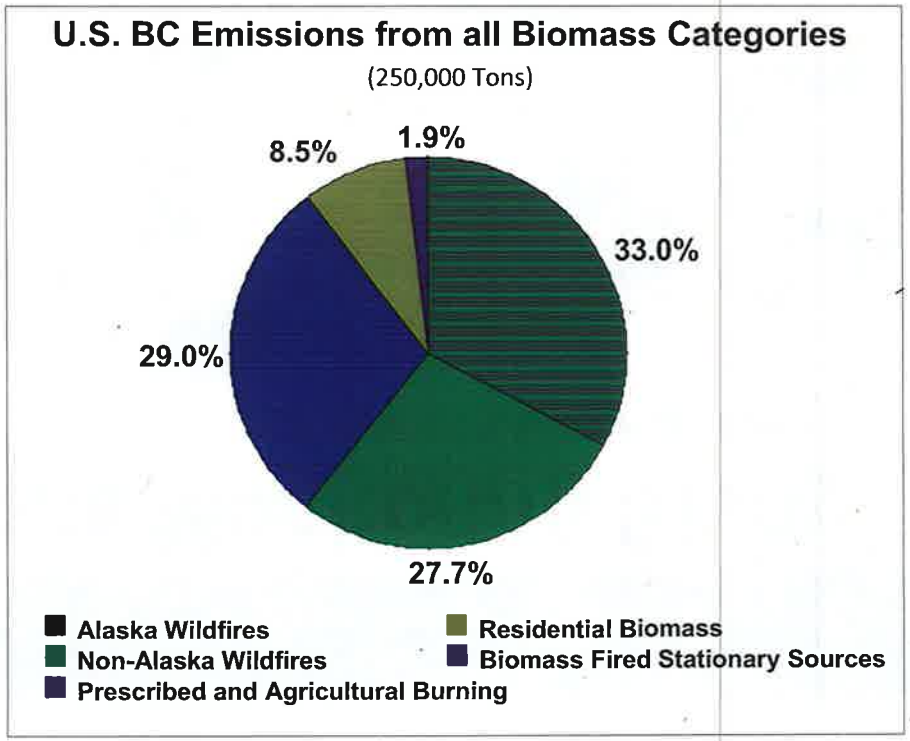
Black Carbon Report to Congress

- October 2009 Interior Appropriations bill: required EPA to issue a report on the climatic and public health effects of black carbon, domestic and global emissions inventories, and cost-effective mitigation approaches
- External peer review draft of the report issued March 18, 2011
  - Available at EPA's Science Advisory Board Website: http://yosemite.epa.gov/sab/sabpeople.nsf/WebCommittees/COUNCIL
- Peer review panel meeting held in Washington D.C., April 18-19, 2011
  - Final letter containing Black Carbon Review Panel's advice and recommendations expected by end of July
  - Final report planned for release in Fall 2011
- Earlier draft was reviewed informally by other federal agencies, including USDA.
  - USDA provided valuable input on inventories and mitigation approaches for open biomass burning, including agricultural burning

Biomass Burning in Report to Congress on BC

- Biomass burning ~ 39% of domestic black carbon inventory
  - 90% of this is "open biomass burning", which is dominated by wildfire (68%), followed by prescribed fire (26%) and agricultural burning (6%)
  - Biomass burning also leads to high emissions of organic carbon (OC), which exerts a cooling influence on climate. Therefore, mitigation efforts may be less effective for climate than controls on other sectors dominated by BC, such as mobile diesel

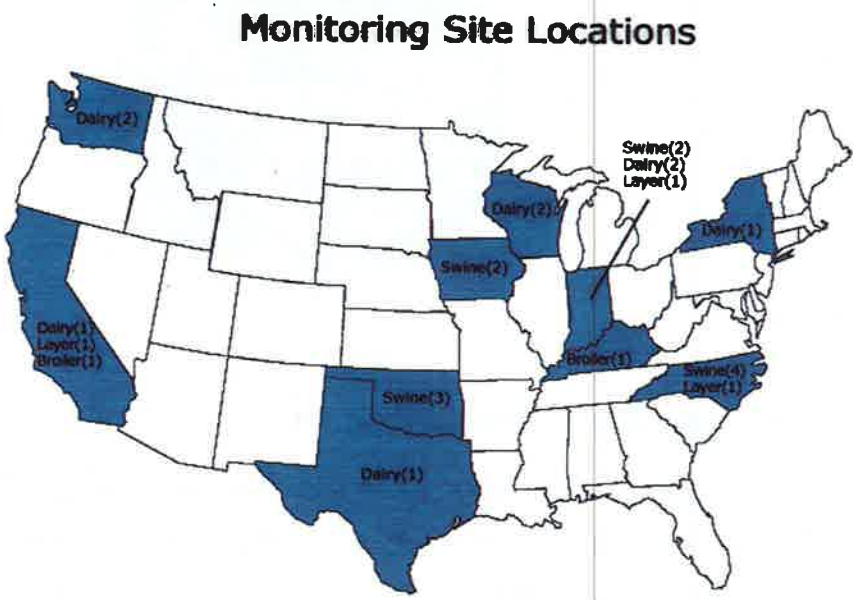
- Available $PM_{2.5}$ emissions reduction techniques for open biomass burning may reduce BC
  - Substantial uncertainty remains, especially given diverse, site-specific burning conditions.
- Appropriate mitigation measures depend on timing /location of burn, resource management objectives, vegetation type, and available resources.



EPA United States Environmental Protection Agency

National Air Emissions Monitoring Study

- Background
  - 2 year, industry-funded study coordinated by Purdue University with EPA oversight
  - 24 sites in 10 states were monitored from 2007-2010
  - Study gathered emissions data for PM (PM_{10}, $PM_{2.5}$, TSP), NH_3, H_2S, and VOCs



  - Data will be used to develop emission estimating methodologies (EEMs) for broiler, egg layer, swine, and dairy AFOs
  - NAEMS data and summary reports were made public on January 13, 2011: http://www.epa.gov/airquality/agmonitoring/
  - January 19, 2011: EPA issued a Call for Information

EPA United States Environmental Protection Agency

National Air Emissions Monitoring Study

- Schedule
  - Draft EEMs will be released for public review and comment on a rolling basis in the following order:
    - Broilers, Swine, Egg-layers, Dairy
  - Broiler draft anticipated to be released in June 2011
  - All EEMs are scheduled to be finalized by June 2012
  - Extensive outreach to all stakeholders during public review process
    - Webinars, conference calls, face-to-face meetings
- USDA collaboration
  - 2 NRCS and 2 ARS members will take part in the development of the methodologies

EPA United States Environmental Protection Agency

Fire Policy

EPA United States Environmental Protection Agency

Biogenics/Biofuels for GHGs

- Proposed deferral rule – deferral of applicability for CO_2 emissions from bioenergy/biogenic sources under PSD and Title V programs (proposed March 21, 2011)
- Interim guidance was also issued to help permitting authorities determine how to treat biogenic CO2 emissions until the deferral rule is final
- During 3 year deferral period, EPA is conducting a detailed examination of the science associated with accounting for biogenic CO2 emissions from stationary sources
- EPA is currently reviewing the submitted comments (comment period closed May 5, 2011)
- After the examination is complete: follow-on rulemaking to explain how biogenic CO2 emissions should be treated and accounted for in PSD and Title V programs

Requests and Petitions

- Ammonia
  - April 2011 petition to regulate NH_3 as a criteria pollutant under CAA sections 108 and 109
    - Major Petitioners: EIP, Assoc. of Irritated Residents, Food & Water Watch, HSUS, Johns Hopkins Center for a Livable Future, Sierra Club, Waterkeeper Alliance
- CAFOs
  - September 2010 petition to list CAFOs under CAA section 111(B)
    - Pollutants of concern: GHGs (CH_4, N_2O), H_2S, NH_3, PM, VOCs
    - Major Petitioners: HSUS, Assoc. of Irritated Residents, CRPE, EIP, Sierra Club, Waterkeeper Alliance
- Hydrogen Sulfide
  - March 2009 request to list H_2S as a HAP under CAA section 112(B)
    - Major Petitioners: Sierra Club along with Earthjustice, EIP

From:	Randy Waite
To:	Kathleen Deener
Cc:	Anne Rea; Audrey Galizia; Bill Schrock; Bryan Hubbell; Chris Sarsony; Christine Davis; Dale Evarts; David Schmeltz; Elizabeth Corona; Ginger Tennant; John Vandenberg; JTravis Smith; Karen Hammerstrom; Karen Martin; Kelly Rimer; Kris Novak; Lydia Wegman; Lynn Flowers; Margaret Zawacki; Mary Reiley; Paul White; Randy Waite; Richard Haeuber; Robin Dunkins; Rosalina Rodriquez; Samantha Jones; Sarah Mazur; Susan Rieth; Tara Greaver; Vincent Cogliano
Subject:	Re: Briefing on draft IRIS ammonia assessment
Date:	08/01/2012 01:16 PM
Attachments:	PETITIONS.docx

Hi Kacee,
You mentioned to me that you would be interested to hear a little about the two petitions we have received related to ammonia. Attached is a short description of the two petitions for your perusal. I am looking forward to the call this afternoon.
Thanks,
Randy

Randy Waite
Air-Water Program Manager
Health and Environmental Impacts Division
Office of Air Quality Planning and Standards
US Environmental Protection Agency
919-541-5447

From: Waite, Randy
To: Waite, Randy
Subject: Ammonia Petition
Date: Thursday, May 01, 2014 1:33:08 PM
Attachments: Ammonia Petition.msg

Subject: Ammonia Petition

Location: RTP-OAQPS-541-4486-SPPD/Phone-Line/RTP-OAQPS-BLDG-C; RTP-OAQPS-E141B/RTP-OAQPS-BLDG-E

Start: Tue 4/16/2013 1:30 PM

End: Tue 4/16/2013 2:00 PM

Recurrence: (none)

Meeting Status: Accepted

Organizer: Dunkins, Robin

Required Attendees: Schrock, Bill; Waite, Randy; Harnett, Bill; Igoe, Sheila; hannon, john

Optional Attendees: Tennant, Ginger

Schrock, Bill

From: Schrock, Bill
Sent: Friday, November 01, 2013 8:08 AM
To: 'Hannah Connor'
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act
Attachments: HSUS Petition Update_103113.pdf

Hannah-Attached is a letter summarizing our recent conversations. Let me know if you need anything else. Thanks

Bill Schrock
U.S. EPA
RTP, NC 27709
(919) 541-5032
(919) 541-3470 (fax)

From: Hannah Connor [mailto:hconnor@humanesociety.org]
Sent: Wednesday, September 25, 2013 3:03 PM
To: Dunkins, Robin; Schrock, Bill
Cc: theinzen@environmentalintegrity.org
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Robin,

Thank you for your and Larry Elmore's presentation during the Environmental Justice Community Conference Call this afternoon. I found it quite interesting. In particular, during the call (and in response to specific stakeholder concerns about ongoing problems related to releases of air pollutants from CAFOs into communities and the environment), you stressed the HSUS and EIP petitions for regulating CAFOs under the Clean Air Act, and provided that the Agency is in the process of analyzing and making a determination on the regulatory requests contained therein. This seems to me to be different from the position taken by the Agency during our August meeting (as partially summarized below); but since I have not yet received a summary letter from the Agency on that meeting, perhaps it has since decided to alter or otherwise revise its approach and estimated timeline for responding to these petitions. If the Agency has revised its approach and/or estimated timeline for determination, we would be very interested in discussing those changes with you. If it has not, please provide the status update and encapsulation letter, as promised during the August 20 meeting.

Thank you,

Hannah Connor
Staff Attorney
The Humane Society of the United States
Animal Protection Litigation

2100 L Street NW Washington, DC 20037
t 202.676.2354 f 202.676.2357
hconnor@humanesociety.org
humanesociety.org/litigation

From: Hannah Connor
Sent: Thursday, September 05, 2013 12:11 PM
To: 'Dunkins, Robin'; 'schrock.bill@epa.gov'
Cc: Laura Schierhoff
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Ms. Dunkins and Mr. Schrock,

Thank you again for meeting with Laura Schierhoff, Tarah Heinzen, and me on August 20. During that meeting, we discussed the 2008 Humane Society petition to the U.S. EPA to list concentrated animal feeding operations (CAFOs) as a category of sources under section 111(B)(1)(A) of the Clean Air Act, and to promulgate standards of performance for new CAFOs ("HSUS petition"), and you provided us with an update on the Agency's consideration of that petition. At the end of the meeting, you agreed that the EPA would provide the HSUS with a letter summarizing our conversation. As discussed, the letter was to address, at a minimum, the following points:

1. A confirmation that the Agency will not, at this time, open a docket for this request;
2. A summary of the Agency's position that it does not intend to consider the HSUS petition until after the Air Compliance Agreement and related Emissions Estimating Methodologies are finalized and the terms of the Agreement are completed, and the Agency's related reasoning;
3. An estimated timeline for when the Agency believes that it will consider and substantively respond to the HSUS petition; and
4. A confirmation that the EPA has not yet assigned a tracking number to this petition.

I have not yet received such an encapsulation a letter from the Agency, but am hopeful that the Agency has merely not had the opportunity to complete the request. Can you please provide me with an estimate of when you think I should expect to see the discussed letter? I want to make sure it doesn't get lost in the shuffle.

Thank you, again.

Sincerely,

Hannah Connor
Staff Attorney
The Humane Society of the United States
Animal Protection Litigation

2100 L Street NW Washington, DC 20037
t 202.676.2354 f 202.676.2357
hconnor@humanesociety.org
humanesociety.org/litigation

From: Dunkins, Robin [mailto:Dunkins.Robin@epa.gov]
Sent: Thursday, June 06, 2013 6:09 PM
To: Hannah Connor
Cc: Laura Schierhoff
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Ms. Connor, my apologies for not getting back to you sooner. I've been in and out of the office this past month. I will call you or Laura Schierhoff next week to set up some time to discuss a status update.

Thank you,
Robin Dunkins

From: Hannah Connor [mailto:hconnor@humanesociety.org]
Sent: Monday, May 13, 2013 3:48 PM
To: Dunkins, Robin
Cc: Laura Schierhoff
Subject: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Ms. Dunkins,

I am writing to request that the EPA provide a status update on its consideration of the pending Humane Society of the United States petition to list concentrated animal feeding operations ("CAFOs") as stationary sources and to promulgate all commensurate standards of performance under the Clean Air Act. The petition was submitted to the Agency in September of 2009.

I would also like to formally request for the EPA to open a docket on this petition, if it has not done so already.

My predecessor's notes list you as the primary agency contact on this petition. If that is not accurate, I respectfully request that you please direct this inquiry to the correct contact, and that you provide me with that party's contact information.

I look forward to hearing from you on this matter at your earliest convenience.

Thank you,

Hannah Connor
Staff Attorney
The Humane Society of the United States
Animal Protection Litigation

2100 L Street NW Washington, DC 20037
t 202.676.2354 f 202.676.2357
hconnor@humanesociety.org
humanesociety.org/litigation

Schrock, Bill

From: Dunkins, Robin
Sent: Thursday, August 08, 2013 4:25 PM
To: Elmore, Larry; Schrock, Bill
Cc: Igoe, Sheila
Subject: FW: Documents in support of pending AFO air emissions petitions
Attachments: Index of Works in Support of AFO Air Emissions Petitions Aug. 2013.pdf

Fyi...

From: Tarah Heinzen [mailto:theinzen@environmentalintegrity.org]
Sent: Tuesday, August 06, 2013 9:24 AM
To: Waite, Randy; Dunkins, Robin
Subject: Documents in support of pending AFO air emissions petitions

Dear Mr. Waite and Ms. Dunkins,

The Environmental Integrity Project has compiled numerous studies and reports in support of two pending citizen petitions to regulate air emissions from animal feeding operations under the Clean Air Act: Environmental Integrity Project, et al. v. U.S. Environmental Protection Agency, Petition for the Regulation of Ammonia as a Criteria Pollutant under Clean Air Act Sections 108 and 109 (submitted April 2011); and The Humane Society of the U.S., et al. v. U.S. Environmental Protection Agency, Petition to List Concentrated Animal Feeding Operations under Clean Air Act Section 111(B)(1)(A) of the Clean Air Act, and to Promulgate Standards of Performance under Clean Air Act Sections 111(B)(1)(B) and 111(D) (submitted September 2009).

Yesterday EIP sent a CD of the documents and hard copies of the journal articles to you by registered mail. I've attached an index of the studies. Please let me know if you would like us to send you the files electronically as well, or if you have any questions.

Best,

Tarah Heinzen
Attorney
Environmental Integrity Project
One Thomas Circle NW, Suite 900
Washington, D.C. 20005
(202) 263-4441 (office)
(202) 297-7808 (cell)
theinzen@environmentalintegrity.org

Schrock, Bill

From: Schrock, Bill
Sent: Tuesday, August 06, 2013 3:12 PM
To: Elmore, Larry
Subject: Accepted: Environmental Integrity Project's FOIA request

Schrock, Bill

From: Elmore, Larry
Sent: Tuesday, August 06, 2013 2:34 PM
To: Howland, Sanda; Sullivan, Tim; Beasley, Lynn; Igoe, Sheila; Hanlon, Edward; Nugent, Angela; Schrock, Bill; Merrill, Raymond; Myers, Ron; Thompson, Rhonda; Bereznicki, Sarah; Benedict, Kristen; Walker, John; Thoma, Eben; Danny Greene; Dunkins, Robin
Cc: Russell, Sherry
Subject: FOIA - Environmental Integrity Project Animal Feeding Operation Emission Estimating Methodology
Attachments: Heinzen Rqst - EPA-HQ-2013-008469.pdf

I want to make you aware of a FOIA for which you may have response documents. EPA recently received the attached FOIA for the Environmental Integrity Project (EIP) requesting information related to:

1. Our effort to develop emission estimating methodologies (EEMs) for animal feeding operations (AFO);
2. EIP's petition to regulate ammonia as a criteria pollutant; and
3. Humane Society's petition to list concentrated AFOs under the Clean Air Act

My plan is to schedule a teleconference for early next week to discuss submission of the requested information. Prior to our call, I will contact EIP to negotiate are revised schedule to submit the requested data. With regard to the AFO EEM information, I envision it taking until mid October to compile, convert and review the requested material. If you disagree with my proposed schedule, please let me know as soon as possible.

With regards to the AFO EEM request, if you are no longer your office's contact for this project, please let me know who has been assigned as your replacement.

Robin – in addition to yourself, whom should I add to this distribution list for items 2 & 3 of EIP's request?

Danny – please coordinate this FOIA within ERG and your subcontractor(s).

Thanks!!
Larry Elmore
US EPA
Office of Air Quality Planning & Standards
919/541-5433 (phone)
919/541-3470 (fax)

Schrock, Bill

From: Dunkins, Robin
Sent: Tuesday, August 06, 2013 2:27 PM
To: Schrock, Bill
Subject: Fw: HSUS 2009 Petition

From: Laura Schierhoff <lschierhoff@humanesociety.org>
Sent: Tuesday, August 06, 2013 10:38:49 AM
To: Dunkins, Robin
Subject: HSUS 2009 Petition

Good morning Robin,

I was hoping to touch base with you on our petition submitted in 2009. Any availability you may have to have a short discussion on the status would be really appreciated. Please let me know if you are not the contact person for this petition any longer.

Thank you!

Laura Schierhoff
Regulatory Specialist, Federal Affairs
lschierhoff@humanesociety.org
t 202.955.3670 **f** 202.676.2301

The Humane Society of the United States
2100 L Street NW Washington, DC 20037
humanesociety.org
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Schrock, Bill

From: Waite, Randy
Sent: Tuesday, July 09, 2013 10:36 AM
To: Tarah Heinzen
Cc: Schrock, Bill; Eric Schaeffer
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

Hi Tarah,
The call in number for today's call at 3:00 EDT will be 919-541-4376. If by chance you call and get an error message, it just means that we haven't opened the line yet, but will shortly.
Thanks,
Randy

From: Tarah Heinzen [mailto:theinzen@environmentalintegrity.org]
Sent: Wednesday, July 03, 2013 9:36 AM
To: Waite, Randy
Cc: Schrock, Bill; Eric Schaeffer
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

Hi Bill,
July 9th at 3:00 works for me and Eric to discuss the status of EIP's ammonia petition. Please let me know if there will be a call in number.
Thanks,
Tarah

Tarah Heinzen
Attorney
Environmental Integrity Project
One Thomas Circle NW, Suite 900
Washington, D.C. 20005
(202) 263-4441 (office)
(202) 297-7808 (cell)
theinzen@environmentalintegrity.org

From: Waite, Randy [mailto:Waite.Randy@epa.gov]
Sent: Thursday, June 27, 2013 1:52 PM
To: Tarah Heinzen
Cc: Schrock, Bill
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

Hi Tarah,
I am out of the office from July 1 through July 8 and will not have email contact. A co-worker, Bill Schrock will be in on July 2. If you can send him an email with times that you and Eric are free, he will be happy to schedule the meeting for us. It looks like July 9 between 3:00 and 4:00 might be the best time for us.
Thanks,
Randy

From: Tarah Heinzen [mailto:theinzen@environmentalintegrity.org]
Sent: Wednesday, June 19, 2013 2:02 PM
To: Waite, Randy
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

Hi Randy,

We would appreciate a status call. Our Executive Director, Eric Schaeffer, is out without email access until July 2nd, and I would like to schedule the call for a time when he can join. I'll check in with him about his schedule when he returns – in the meantime, if there are any good times on July 3rd or the week of the 8th, please let me know.

Thanks,

Tarah Heinzen
Attorney
Environmental Integrity Project
One Thomas Circle NW, Suite 900
Washington, D.C. 20005
(202) 263-4441 (office)
(202) 297-7808 (cell)
theinzen@environmentalintegrity.org

From: Waite, Randy [mailto:Waite.Randy@epa.gov]
Sent: Wednesday, June 19, 2013 8:38 AM
To: Tarah Heinzen
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

Hi Tarah,
We would like to have a call to discuss the status of the petition with you. What are some good times for you, possibly later this week or next?
Thanks,
Randy

From: Tarah Heinzen [mailto:theinzen@environmentalintegrity.org]
Sent: Monday, June 10, 2013 2:39 PM
To: Waite, Randy
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant
Importance: High

Hi again Randy,
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Washington, D.C. 20005
(202) 263-4441 (office)
(202) 297-7808 (cell)
theinzen@environmentalintegrity.org

From: Tarah Heinzen
Sent: Monday, April 29, 2013 10:59 AM
To: 'Waite, Randy'
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

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Subject: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

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Schrock, Bill

From: Laura Schierhoff [lschierhoff@humanesociety.org]
Sent: Monday, July 08, 2013 1:42 PM
To: Dunkins, Robin
Cc: Schrock, Bill
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Hi Robin,

I wanted to check in with you about this meeting and whether you received my last email with our availability. I have been having problems with my email, so you may not have received it. If we could meet sometime in the next couple weeks, that would be great.

Thank you,
Laura Schierhoff

From: Dunkins, Robin [mailto:Dunkins.Robin@epa.gov]
Sent: Tuesday, June 25, 2013 9:48 AM
To: Hannah Connor
Cc: Laura Schierhoff; Schrock, Bill
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Hannah,

I'm checking to see your availability the early part of the week of July 8. Please advise.

Thanks
Robin Dunkins

From: Hannah Connor [mailto:hconnor@humanesociety.org]
Sent: Thursday, June 06, 2013 6:15 PM
To: Dunkins, Robin
Cc: Laura Schierhoff
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

That would be great.

Sincerely,

Hannah Connor
Staff Attorney
The Humane Society of the United States
Animal Protection Litigation

2100 L Street NW Washington, DC 20037
t 202.676.2354 f 202.676.2357
hconnor@humanesociety.org
humanesociety.org/litigation

THE HUMANE SOCIETY
OF THE UNITED STATES

Celebrating Animals | Confronting Cruelty

From: Dunkins, Robin [mailto:Dunkins.Robin@epa.gov]
Sent: Thursday, June 06, 2013 6:09 PM
To: Hannah Connor
Cc: Laura Schierhoff
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Ms. Connor, my apologies for not getting back to you sooner. I've been in and out of the office this past month. I will call you or Laura Schierhoff next week to set up some time to discuss a status update.

Thank you,
Robin Dunkins

From: Hannah Connor [mailto:hconnor@humanesociety.org]
Sent: Monday, May 13, 2013 3:48 PM
To: Dunkins, Robin
Cc: Laura Schierhoff
Subject: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Ms. Dunkins,

I am writing to request that the EPA provide a status update on its consideration of the pending Humane Society of the United States petition to list concentrated animal feeding operations ("CAFOs") as stationary sources and to promulgate all commensurate standards of performance under the Clean Air Act. The petition was submitted to the Agency in September of 2009.

I would also like to formally request for the EPA to open a docket on this petition, if it has not done so already.

My predecessor's notes list you as the primary agency contact on this petition. If that is not accurate, I respectfully request that you please direct this inquiry to the correct contact, and that you provide me with that party's contact information.

I look forward to hearing from you on this matter at your earliest convenience.

Thank you,

Hannah Connor
Staff Attorney
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Schrock, Bill

From: Tarah Heinzen [theinzen@environmentalintegrity.org]
Sent: Wednesday, July 03, 2013 9:36 AM
To: Waite, Randy
Cc: Schrock, Bill; Eric Schaeffer
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

Hi Bill,
July 9th at 3:00 works for me and Eric to discuss the status of EIP's ammonia petition. Please let me know if there will be a call in number.
Thanks,
Tarah

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From: Waite, Randy [mailto:Waite.Randy@epa.gov]
Sent: Thursday, June 27, 2013 1:52 PM
To: Tarah Heinzen
Cc: Schrock, Bill
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

Hi Tarah,
I am out of the office from July 1 through July 8 and will not have email contact. A co-worker, Bill Schrock will be in on July 2. If you can send him an email with times that you and Eric are free, he will be happy to schedule the meeting for us. It looks like July 9 between 3:00 and 4:00 might be the best time for us.
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Schrock, Bill

From: Tarah Heinzen [theinzen@environmentalintegrity.org]
Sent: Thursday, June 27, 2013 2:04 PM
To: Waite, Randy
Cc: Schrock, Bill
Subject: RE: EIP 2011 Petition to list ammonia as a CAA criteria pollutant

Thanks Randy and Bill,
I'll be in touch about availability when Eric is back next week. Hopefully the 9th will work for us as well.
Best,
tarah

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Schrock, Bill

From: Laura Schierhoff [lschierhoff@humanesociety.org]
Sent: Tuesday, June 25, 2013 1:13 PM
To: Dunkins, Robin; Hannah Connor
Cc: Schrock, Bill
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Hi Robin,

Thanks so much for getting back to us regarding our petition. I spoke with Hannah and we both have afternoons free on Thursday the 11th and Friday the 12th. We are looking forward to discussing the status of our petition with you and please let me know if these days/times do not work for you.

Thanks,
Laura Schierhoff

From: Dunkins, Robin [mailto:Dunkins.Robin@epa.gov]
Sent: Tuesday, June 25, 2013 9:48 AM
To: Hannah Connor
Cc: Laura Schierhoff; Schrock, Bill
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

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Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Hannah,

I'm checking to see your availability the early part of the week of July 8. Please advise.

Thanks
Robin Dunkins

From: Hannah Connor [mailto:hconnor@humanesociety.org]
Sent: Thursday, June 06, 2013 6:15 PM
To: Dunkins, Robin
Cc: Laura Schierhoff
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

That would be great.

Sincerely,

Hannah Connor
Staff Attorney
The Humane Society of the United States
Animal Protection Litigation

2100 L Street NW Washington, DC 20037
t 202.676.2354 f 202.676.2357
hconnor@humanesociety.org
humanesociety.org/litigation

From: Dunkins, Robin [mailto:Dunkins.Robin@epa.gov]
Sent: Thursday, June 06, 2013 6:09 PM
To: Hannah Connor
Cc: Laura Schierhoff
Subject: RE: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Ms. Connor, my apologies for not getting back to you sooner. I've been in and out of the office this past month. I will call you or Laura Schierhoff next week to set up some time to discuss a status update.

Thank you,
Robin Dunkins

From: Hannah Connor [mailto:hconnor@humanesociety.org]
Sent: Monday, May 13, 2013 3:48 PM
To: Dunkins, Robin
Cc: Laura Schierhoff
Subject: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

Ms. Dunkins,

I am writing to request that the EPA provide a status update on its consideration of the pending Humane Society of the United States petition to list concentrated animal feeding operations ("CAFOs") as stationary sources and to promulgate all commensurate standards of performance under the Clean Air Act. The petition was submitted to the Agency in September of 2009.

I would also like to formally request for the EPA to open a docket on this petition, if it has not done so already.

My predecessor's notes list you as the primary agency contact on this petition. If that is not accurate, I respectfully request that you please direct this inquiry to the correct contact, and that you provide me with that party's contact information.

I look forward to hearing from you on this matter at your earliest convenience.

Thank you,

Hannah Connor
Staff Attorney
The Humane Society of the United States
Animal Protection Litigation

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THE HUMANE SOCIETY OF THE UNITED STATES
Celebrating Animals | Confronting Cruelty

Schrock, Bill

From: Dunkins, Robin
Sent: Monday, May 13, 2013 3:51 PM
To: Harnett, Bill; Culligan, Kevin; Fruh, Steve; Schrock, Bill; Elmore, Larry
Cc: Igoe, Sheila; Zenick, Elliott; Ginsburg, Eric; McLamb, Marguerite
Subject: FW: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

fyi

From: Hannah Connor [mailto:hconnor@humanesociety.org]
Sent: Monday, May 13, 2013 3:48 PM
To: Dunkins, Robin
Cc: Laura Schierhoff
Subject: HSUS 2009 Petition to List CAFOs as Stationary Sources under the Clean Air Act

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Thank you,

Hannah Connor
Staff Attorney
The Humane Society of the United States
Animal Protection Litigation

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hconnor@humanesociety.org
humanesociety.org/litigation

Dear Mr. Waite,

I am writing to request a status update on EPA's consideration of the Environmental Integrity Project's pending April 5, 2011 petition to list ammonia under section 108 of the Clean Air Act as a criteria pollutant, and to request that EPA open a docket on the petition.

A copy of EPA's petition acknowledgement letter is attached. I would be happy to discuss the petition and request for a docket at your convenience.

Best,

Tarah Heinzen
Attorney
Environmental Integrity Project
One Thomas Circle NW, Suite 900
Washington, D.C. 20005
(202) 263-4441 (office)
(202) 297-7808 (cell)
theinzen@environmentalintegrity.org